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Preventing Losses in Factory Power Plants

Savings Effected in Power Transmission by Shafting and in Boiler and Engine Rooms—The Supervising Engineer as an Industrial Plant Necessity

BY S. J. H. WHITE

Many very serious and costly preventable losses exist in the majority of power plants. They may in the course of a year amount to hundreds or even thousands of dollars and may be easily detected, located and removed by simple and inexpensive methods as a rule. By preventable losses is meant those losses resulting from carelessness, lack of methods, poor design or selection of apparatus, improper handling, improper selection of fuel, oils, etc., and very largely the absence of proper records by which daily comparisons may be made of plant performances.

Usually the local engineer in charge and the manager of the plant have no knowledge of the wastes going on every day or perhaps every minute; neither is the slightest effort made to determine if any such losses exist. Occasionally one finds a plant keeping fairly complete records of daily performances, and a capable man in the capacity of supervising engineer to make daily comparisons of operation performance of furnaces, boilers, engines, generators, etc., but such cases are probably an exception to the rule, particularly in the smaller or medium sized plants, where the percentage of losses is usually the greatest.

One of the chief reasons for this condition is the fact that it is usually difficult and frequently impossible for an engineer, no mater how capable and ambitious he may be, to persuade the general manager of his plant to furnish him with the necessary instruments and devices to make daily tests, and the printed forms on which to record the data secured.

Yet the resultant savings of such daily tests and comparisons frequently will pay within one month for all the additional expenses incurred within a year.

WHY A SUPERVISING ENGINEER

Occasionally a consulting, efficiency or industrial engineer is called on to test the plant. He will submit a lengthy and excellent technical report in which several recommendations may appear, which if carried out will probably result in appreciable or possibly large savings. He will also usually leave much advice as to handling the plant. But how long will the improvement due to his work last? A very short time as a rule, as advice is soon forgotten even if willingly accepted.

The only successful way to keep down the variable and preventable losses is to hunt for them daily; the cost of hunting them is far less than the cost of ignoring them. Hence the services of a consulting engineer will give very good temporary relief but no more, while a supervising engineer will give results in improved conditions and efficiency, and save his salary many times over in many plants.

In all plants using steam even if only for heating purposes, scales should be installed to weigh coal as used, and to weigh ashes daily; in the event that crude oil is used for fuel install a meter to measure the oil consumed daily; a hot water meter should be set in the boiler feed line to measure all water fed to boilers; a recording watt-hour meter should be installed to measure the electrical output and a recording steam gauge to check the work of firemen; steam meters for each boiler are advisable; thermometers to test temperature of boiler feed water, condenser cooling water, etc., are also advisable, and such other instruments and devices as the size and nature of plant would justify.

Printed forms should be furnished suitably designed to record the rate of evaporation of water per pound of fuel; the number of pounds of refuse from furnaces; per cent. of refuse of total fuel consumed; total pounds of fuel consumed; rate of combustion per square foot of grate area per hour; boilers output in pounds of water; average steam pressure carried; hours of operation; temperature of feed water; inches of vacuum; pounds of fuel per kilowatt-hour; and all similar data which local conditions would suggest. These records should be as complete as the nature and size of the plant justifies; but in all cases sufficient data should be recorded to make daily comparisons of value in detecting any increase of losses which may arise within the course of a day's run.

Though the power expense may be a small part of the unit cost of the product of a factory, it may be reduced by a cost-keeping system, which, unlike the general factory cost-keeping system, always effects economies more than meeting its own cost.

A supervising engineer is indispensable, as one whose training allows him to comprehend the possibilities of each condition or suggestion.

NEED OF OBSERVATIONS CONCRETELY EXPLAINED

Suppose you note from the daily records that the boilers evaporated 7 lb. of water per pound of fuel to-day; while

yesterday 8 lb. of water were evaporated; there is a cause for this difference, and the right kind of man will not rest until he locates and removes the cause. It may be due to a new car of coal just received, the quality of which is not so good as former cars. Perhaps the firemen were too busy to scrape the boiler flues; show them how to be more systematic in their work, so they will have time for this work in the future. Above all things, make them understand that you know what is going on in the boiler room and cannot be fooled. Perhaps the load was much lighter; then take it up with the works manager and show him the advisability of balancing his operating conditions to better advantage. Some boiler plants are so located with relation to adjoining buildings that when the wind blows from certain directions the draft is seriously affected, resulting in poorer furnace efficiency; watch this point and if it applies to your case, estimate from the records how long it will take the possible savings resulting from a higher stack to pay for the cost of fifty or more feet of additional stack, and put it up to the general manager as a dollar and cents proposition.

There is a cause for every effect; the daily records show each effect and it is up to you to locate and remove causes of loss and to develop all causes bettering the efficiency—it is a very interesting study.

Suppose the records show 8 lb. of fuel per kw-hr. today and only 6 lb. yesterday; what causes this effect? Assuming the load conditions, and the boiler evaporation were the same both days, there evidently has occurred a change in the engine economy; this may be due to one or more of several things; perhaps a piston ring broke; or possibly an eccentric has slipped; the fact there is an apparent change in the engine economy would, or at least should, start an immediate investigation to locate and remove the cause for this very apparent loss. Without the evidence of the daily records the costly loss probably would not be detected for weeks, perhaps for months, or possibly not at all. The writer knows of one case where a 16 x 36-in. Corliss engine was run for three years without any piston rings; of course this was an exceptional case, and the manager and engineer were unusually incompetent, the load unusually light, etc., but there are many plants suffering from nearly as severe losses caused by nearly as foolish lack of observation.

It is not always easy to locate the immediate causes of these variable losses, especially the smaller ones, but daily analysis of operation performances will soon make a man very quick in running down losses and their causes, and further will train him to take the necessary steps to prevent their occurrence.

A WAY OF ENLISTING CO-OPERATION OF EMPLOYES

The knowledge that a capable man is daily comparing the operation records also has a very decided and excellent effect on the engineers and firemen; at first these men will usually resent the idea of being so closely watched, but by taking them into your confidence, showing them the daily records, complimenting them upon an improvement in economies and consulting with them in an effort to locate undue losses, they soon learn and realize that this watching is a personal benefit to them, results in making better men of them and is a decided help to them in gaining knowledge. Frequently it will result in a friendly competition between shifts, and between their plant and their neighbors' to secure more work from a pound of fuel than the other fellow.

Of course occasionally men will resort to tricks to deceive. In one experience of this kind the writer found a fireman who thought he could raise the rate of evaporation by blowing off the boilers, and then pumping in fresh water; it raised the rate of evaporation slightly, but also started an investigation of the engine economy, as apparently the engine was consuming more steam than ordinarily. The engineer discovered the cause of the discrepancy and the fireman lost his job.

A fireman in another plant was complimented on improved evaporation due to his permitting the safety valve to open too frequently; of course fuel was wasted and two or three days' records were sufficient to put a stop to it.

Frequently the power consumed shows a slight increase from month to month, or perhaps day to day, with the same factory production output. It is seldom an error develops in the meter. In electrically driven plants, and as most managers are inclined to believe, probably several adjusting screws or bolts have worked loose in shafting hangers throwing the shafting out of line; possibly some oiler noticed some bearing caps were loose and tightened them down too much; perhaps the millwrights to please some workmen have made some belts too tight or possibly the purchasing department thought to save money by buying oil at a little less per gallon than had been paid. The losses in line shafting are the hardest to locate, but they cost a lot of money if permitted to exist, and should be run down and removed promptly. Daily tests and records will show their existence and development.

Frequent testing for losses of line shafting is advisable; the tests are simple and inexpensive in cases of group drives by electric motors.

Daily hunting for preventable losses is far less expensive than ignoring them.

The load condition very seriously affect the efficiencies of furnaces, boilers, engines, etc.; it is well to remember this point and attempt to balance production of factory to keep the load on power plant up to an economical point. The practice of working one or two departments overtime frequently is very far from good management as a rule; it would be much better economy to increase equipment and number of workmen in those departments, so that all departments would be balanced in output and capacity, and overtime of any one department would be unnecessary.

HOW A 25 PER CENT. SAVING WAS MADE

A few years ago the writer supervised an isolated power plant which was entirely too large for the requirements of the factory; the load factor was only about 18 per cent. of the plant rating at that time. The losses as a consequence were tremendous. The engine was a simple Corliss type belted to an alternating current generator; the boilers were of the regular horizontal return tubular high-pressure type; the engine was designed to operate at 108 r.p.m. and was operated at this speed when the writer took charge. He ordered the necessary generator and engine governor pulleys to drop the speed to 82 r.p.m.; made tests to determine what steam pressure to carry at various loads in order to secure the most economical cut-off on engine. The drop in speed of engine and reduction in boiler pressure to meet load conditions, resulted in a saving of 25 per cent. of fuel consumed. This saving was entirely due to an improvement in engine performance by maintaining the most economical point of cut-off.

The rate of evaporation was at this time only approximately 3 lb. of water per pound of fuel;

evidently then more load was necessary to improve the boilers' efficiencies. The factory was fully equipped with machinery and workmen, hence there seemed no opportunity to secure more load in the shop. But gas was used for heating the Japan baking ovens, and the writer designed and built in the shop an electric baking oven. It was so successful that six more were built within a short time. This electric oven load brought the total load factor up to 41.4 per cent. of plant rating, and the boilers with this load evaporated 6.5 to 7 lb. of water per pound of fuel. As the rate of evaporation more than doubled and the load was practically doubled, it required no additional fuel to carry the load of the ovens. The work of the electric ovens gave far superior results to that of the gas ovens, and further saved between $5 and $6 per day for gas.

Tests proved that the best furnace efficiency was obtained when the rate of combustion was about 18 to 20 lb. of screenings per square foot of grate area per hour. An increase in the combustion rate showed a more marked loss than a decrease to certain limits. Previous tests on the boilers showed that their evaporative efficiencies fell very rapidly below one-half load, whereas the curve of evaporation rate was fairly flat from ½ to 1¼ load.

The load on one boiler tended to give higher boiler efficiency than when carried on two boilers, but with one boiler the furnace was forced to burn 35 to 40 lb. of fuel per square foot per hour, resulting in serious losses of furnace efficiency, hence it evidently was a stack problem—forced draft or more grate area. A higher stack would have increased the economical rate of combustion, or a suitable forced draft would have done so. But an increased grate area seemed worthy of trial and new grates having 20 per cent. more area were installed in one furnace; this resulted in a decided saving during the day load, but a loss during night run when the load consisted only of maintaining steam on the fire pump for sprinkler system. The net gain, however, soon paid for the cost of installing the larger grates. The company was at this time contemplating a move to another city, and for this reason the writer did not recommend a higher stack, which was after all the proper solution of the problem, as it is in a great many plants.

DAILY RECORDS SAVED $1000 ON COAL ALONE

The losses detected and removed by the daily records and by the writer in this plant amounted to over $1000 per year on coal costs alone, with an annual output of approximately 231,000 kwhr. This is a saving of approximatedly 0.43 cents per kwhr. or about 31 per cent. of the total cost of production, including fixed charges, and about 70 per cent. of the cost for fuel, labor, oil and waste. The cost per kwhr. during 1913 in this plant, including fixed charges of 14 per cent. on the investment, fuel, labor, oil and waste was 1.07 cents per kwhr.; considering that the load factor averaged only 41.4 per cent. of rating, the record is indeed an excellent one and was made possible only by the closest daily supervision.

The weighing of coal as used was proved valuable in another way. The management closed a contract for coal supply with a certain dealer. The writer detected a very decided difference in the quality of the coal and a shortage of weights after the third car had been shipped on this contract. He reported the matter and made complaint to the management but the matter was not attended to as it should have been. Inside of a very short time the company had been billed with and paid for 70,000 lb. of coal which it had not received; in short the weights given on the bills had apparently been raised 10,000 lb. per car, and further the coal had not been shipped from the mine specified in the contract.

The daily records showed this all up very plainly. Without these daily records these facts would not have been detected for months if ever. How much would the company have lost on short weights alone in the course of a year, to say nothing of the losses resulting from an inferior grade of coal causing the rate of evaporation to drop from 6.5 to 4.5 lb. of water per pound of coal? Of course this contract was canceled and coal purchased elsewhere of much better quality and on a square deal basis.

The proper selection of coal for each plant is essential to secure the maximum economy. Some plants will find screenings to be the most economical, while a plant in the same block may find run of mine to be the best. Still another plant might find nut, pea and screenings the best. Local conditions must be considered, and tests are the only way in which the best. kind of coal can be determined. What your neighbor finds to be the best may be the worst for your plant. Price per ton has very little to do with this matter; it is purely a case of the cost of fuel per pound of steam.

On testing several plants the writer found that run of mine gave higher evaporative efficiency than screenings, but the higher efficiency was not proportional to the higher cost per ton of run of mine, hence the screenings proved to be the more economical. This is not necessarily always the case however. Coal prices unfortunately are not as a rule based upon the relative values as steam producers. Before deciding on any particular class of coal, or upon any particular mine for supply, tests should be made on several classes of coal from several mines, and that class and mine selected which shows the most economical results.

It certainly is profitable to keep these daily records; the cost is not great, and the possible savings enormous when compared to the cost of keeping the records. Most factories maintain a cost keeping department at an expense of several hundred dollars per month. The object is of course to ascertain the cost of producing each and every part manufactured and to prevent unnecessary costs in manufacturing; but at the best his department can hardly be expected to save an amount equal to its cost of maintenance, as it has as a rule no authority over the production departments and can only call attention to an increase in costs. This expense of maintaining a cost keeping department is nevertheless apparently justifiable even in smaller plants; but the maintenance of a department to keep costs on power, heating, lighting, water supply, fire protection, etc., under the supervision of a capable engineer, is seldom attempted, though the resulting savings almost invariably will result in an amount far in excess of the cost of maintaining such a department.

(To Be Continued)

The E. Keeler Company, Williamsport, Pa., after a long series of experiments, has perfected interesting models of the Keeler water-tube boiler. They are constructed largely of glass and are so arranged that the circulation is clearly visible both in the tubes and the drum. Important facts are demonstrated conclusively with these models under steam pressure. The model of the Keeler cross drum boiler is particularly noteworthy from an engineering standpoint, showing why this type furnishes such dry steam. In cities where the company maintains an office demonstrations will be given to interested engineers and associations.

The Electric Furnace in the Foundry*

Points of Superiority of Electric Steel Castings Over Those Made by Other Processes—Power Consumption for Both Hot and Cold Charges

BY WILLIAM G. KRANZ

The increased service demands on some of the products of the National Malleable Castings Company, prompted it about eight years ago to investigate the electric furnace, both in America and in Europe. The process had already been sufficiently developed in Europe to lead us to believe that the electric furnace would most nearly meet our requirements. After further investigation and consultation with the highest authorities on the subject, we decided upon the Heroult type as the simplest and most practicable.

In 1910, we built a furnace of this type, of 300 lb. capacity, for experimental purposes, and although it was crudely constructed the quality of the material we were able to make justified the installation of a 6-ton Heroult furnace in 1912. This furnace has three electrodes, 17 in. in diameter, uses three-phase, 60-cycle current, and is equipped with Thury regulators, which give us good regulation and a uniform load on the line even when cold melting. The power factor of the furnace is 94 per cent.

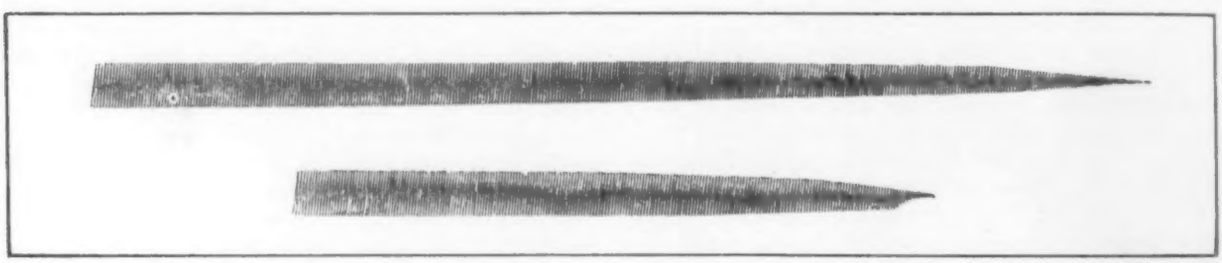
Since July, 1912, the furnace has been in continuous operation, producing up to the present time over 20,000 tons of both carbon and alloy steels of varying analyses and of exceptional quality. Both cold- and hot-metal charges have been used, with a power consumption of about 150 kw-hr. per ton in the case of hot-metal charges and from 500 to 600 kw-hr. per ton in the case of cold charges. The electric energy consumed varies according to the final analysis of the steel and the amount of refining required. Too much cannot be said about the refining possibilities of the electric furnace, for no other method of steel manufacture can compete with the electric in this respect.

In proper operation lies the whole secret of success. That steel has been made electrically means nothing, for when the furnace is operated under oxidizing conditions the quality is no better than that of open-hearth material; but when properly made, electric steel is as good as that made in the crucible, and very much less expensive. The operation of the furnace is simple and the resultant composition is scientifically accurate. I might cite an example in this connection:

On a heat of steel treated under a slag of high-silica content some metallic aluminum was added in order to reduce the silicon from the slag in accordance with the following chemical equation: $3SiO_2 + 4Al = 3Si + 2Al_2O_3$. Upon final analysis it was found that the amount reduced was theoretically correct in accordance with the above equation.

POINTS OF SUPERIORITY

The most important of the many advantages of electric steel castings over those made by the ordinary processes are briefly summarized below, and it should be kept in mind that these apply not only to carbon steels but to the alloy steels as well:



Fatigue Test on an Upton-Lewis Toughness Testing Machine. Annealed basic open-hearth steel (upper), 213 cycles. Annealed electric furnace steel (lower), 345 cycles

Basic Open-Hearth Steel.

C, 0.23; Mu, 0.53; Si, 0.24; P, 0.011; S, 0.038.

Elastic limit, lb. per sq. in.	34,800
Tensile strength, lb. per sq. in.	63,000
Elongation, per cent.	2.95
Reduction of area, per cent.	35.0
Toughness test (fatigue) to break, cycles.	213

Electric Furnace Steel.

C, 0.24; Mu, 0.52; Si, 0.25; P, 0.010; S, 0.019.

Elastic limit, lb. per sq. in.	36,400
Tensile strength, lb. per sq. in.	65,300
Elongation, per cent.	36
Reduction of area, per cent.	55
Toughness test (fatigue) to break, cycles.	345

Absence of segregation, elimination of oxides, and absolute uniformity of composition regardless of atmospheric conditions which affect open-hearth furnaces.

Almost entire elimination of sulphur is possible (an important consideration in steel castings) and complete control of the other elements.

Great tenacity, giving ability to withstand much more abuse and fatigue without rupture.

High ratio of elastic limit to ultimate strength.

A more ready response to heat treatment and with much more uniform results.

Perfect control of pouring temperature, combined with ability to obtain very hot metal, so that light and intricate shapes are readily cast.

Let us take up the advantages of the more important of these qualities of electric steel, and investigate them more fully.

Absence of Segregation, etc.—Absence of segregation and oxides has been firmly established by a great many investigations in our chemical and microscopical laboratories. As a more practical proof of the elimination of oxides, we know that additions of any of the ferroalloys to the bath will be found alloyed with the steel in their theoretical amounts. This is even the case with elements, such as aluminum and titanium, which are so susceptible to oxidation, proving conclusively in our minds that there could be no oxygen present in the steel.

*A paper to be presented at the one hundred and eleventh meeting of the American Institute of Mining Engineers at San Francisco, Cal., in September. The author is manager of the National Malleable Castings Company, Sharon, Pa.

Leading authorities have agreed for some time that the electric steel furnace is the one means of preventing segregation.

W. R. Walker, in May, 1912, read a paper on "Electric Steel Rails" before the American Iron and Steel Institute, in which he stated that "Ingots of even eight tons had been produced electrically which were practically free from segregation."

Elimination of Sulphur.—We know of no authority who doubts the practical elimination of sulphur in electric-furnace operation. We have repeatedly reduced the sulphur to a trace in irons containing as high as 0.30 per cent. sulphur. The rapidity with which this reduction takes place depends somewhat upon the carbon content of the material, the sulphur reducing very much more rapidly in the higher carbon materials.

Tenacity.—To illustrate the great tenacity of electric steel we submit, in the illustration, exact reproductions (reduced) from two tests of two similarly treated specimens of steel, which are typical of a large number made on an Upton-Lewis toughness testing machines. One of these is electric and the other open-hearth, of almost identical analysis. The marked superiority of the electric steel specimen, especially as to its tenacity, is manifest.

Unusual Physical Properties.—During the past year we have developed an electric steel having remarkable physical qualities after heat treatment. This was accomplished without resorting to any of the high-priced alloys. The steel, when subjected to shock or static pull, will stand from four to five times as much stress without distortion as the ordinary open-hearth product. This assertion is not based on a few tests, but on over 3000 made up to the present time.

We have made a great many similar tests of heat-treated open-hearth material, and have invariably found that in certain specimens the physical properties are impaired by the treatment rather than benefited. This is not, however, the case with the electric-furnace product. The old saying that "In order to make good bread you must start with good dough," we believe applies to the steel industry as well.

CONCLUSIONS

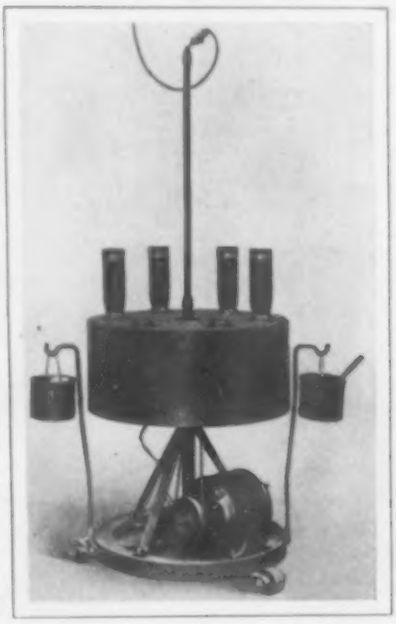
The greatest advantage of the electric-furnace process over all others is its uniformity of product. The open-hearth under certain conditions will, we know, produce steel of very good quality, but there are so many contingencies, such as atmospheric conditions, stack-draft, fuel and furnace variations, beyond the control of the operator, that absolutely uniform results are impossible.

Electric-furnace products are looked upon by some with skepticism, due to those who have adopted the process thinking it a panacea for all of their ills, and who have furnished the trade with products not worthy of the name. The lack of knowledge and the inexperience of the operator should in no way condemn the process. The production of perfect castings does not entirely depend upon the quality of the material of which they are made, but upon the foundry practice to a very great extent. Frequently excellent material is ruined by bad foundry practice. Nevertheless we feel that the electric furnace, with its perfect control of composition and temperature, fills a long-felt want in the industry.

The American Metal Company, whose St. Louis offices have been in the Third National Bank Building in that city, has leased a large suite on the sixteenth floor of the Boatmen's Bank Building and will remove there shortly.

Painting Machine for Shrapnel Shells

For applying the rust preventive paint required by government specifications to shrapnel shells, the Canadian Fairbanks Morse Company, Toronto, Canada, has developed a portable machine. It is mounted on wheels and can be moved around the shop from place to place wherever work is to be done. With this machine it is possible to apply three coats of paint to a shell in less than 1 min.



A Portable Machine That Has Been Developed for Use in Connection with the Painting of Shrapnel Shells

The machine consists of a table with six sockets, and a driving motor which takes its power from the nearest lamp socket, the connection being made at the top of the central standard. The table is mounted on ball bearings and the sockets are driven from the motor through a silent chain drive at a speed of approximately 250 r.p.m. The helper places the shells in the sockets and rotates the table, if necessary, to bring a shell directly in front of the painter. The motor is started and the shells begin to spin, the weight being sufficient to keep the shells in place and withstand the pressure caused by the application of the first coat of paint with a cloth. After one shell has been painted, the table is revolved to bring the next one in front of the painter, and the painted shell is moved out of the way, its rapid rate of rotation being relied upon to cause the paint to dry rapidly. The second coat is applied with a brush, and a brush containing red paint is held against the upper end of the shell to place a red band on it. After the required number of coats of paint have been applied and are thoroughly dry the shell is removed and another one substituted, the process being a practically continuous one from that time on. The shells are handled by a pair of tongs, which is used to catch them on the copper band. The base of the machine is entirely inclosed with a view to guarding against accidents.

The newly formed Spray Mfg. Company, contracting engineer, has started in business at 201 Devonshire street, Boston, Mass., with New York and Chicago branches. It is making a specialty of spray cooling ponds, spray air washers and gas scrubbers, and various engineering applications of spray devices. A. G. Eneas, who organized and developed the Spray Engineering Company, has severed his connections with that company, and taken charge of the engineering department of the new company.

Among new orders issued by the Industrial Commission of Wisconsin, based on recommendations of the auxiliary committee on safety and sanitation, is one providing that employees engaged in work whereby any substance is thrown off which may injure the eyes must be provided with suitable goggles by the employer. Failure to wear the goggles is subject to a 15 per cent. penalty in any resulting compensation.

A Factory City Beautiful at Low Cost

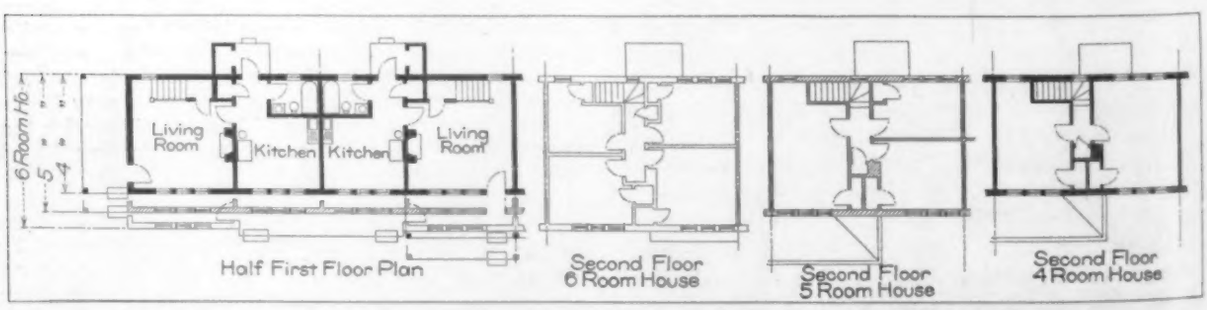
Townsite for the Southern Aluminum Company —Group Dwellings with Variation in Workmen's Houses—Substantial Savings Effected

In North Carolina, near its plant for the manufacture of aluminum, the Southern Aluminum Company has built for its 3000 employees the industrial town of Badin, a noteworthy realization of an industrial community aiming at attractiveness and built at low cost. The entire town, planned and constructed under the supervision of Pierson & Goodrich, Inc., New York, is a development embodying the best of European ideas with American home conveniences.

The town is placed between the company's two groups of factory buildings, ½ mile from the offices and electrode buildings, and 1¼ miles from the dam and furnace buildings on the Yadkin River. The main street, which passes the civic and commercial center, runs between these two points and gives the workmen direct routes to them, due consideration being given to the topography of the ground affecting the economical construction of roads and sewers. Existing county roads through the townsite have been maintained. The universal gridiron type of street planning has been cast aside for a more natural layout that avoids the monotony of the rectangular arrangement.

The blocks are laid out of sufficient size to leave open spaces in the centers for children's playgrounds, tennis courts or extra ground for tenants desiring more land for cultivation. All trees are carefully preserved and wooded areas utilized as parks. The negro quarters are so located that, although the negroes are segregated, they also have direct routes to and from their places of employment. They are placed to the north of the main street, which is devoted entirely to business purposes. No residences face it, and therefore negroes do not need to pass through the white residence districts.

The streets all have a wide grass parking strip and grass gutters along their entire length, with shade trees on the side of the parking strips adjoining the sidewalk. The roadway proper is kept narrow to save in cost of construction and to do away with unsightly expanses of pavement. In this one feature alone a large saving has been made, and yet any roadway can be widened without requiring additional expensive grading, setting back of sidewalks or moving of trees. The upkeep of this type of roadway with its parking strips is small as compared with the interest charges on the much larger initial cost of the standard American roadway, which is paved from curb to curb. The main street is built very wide, as provision has been made

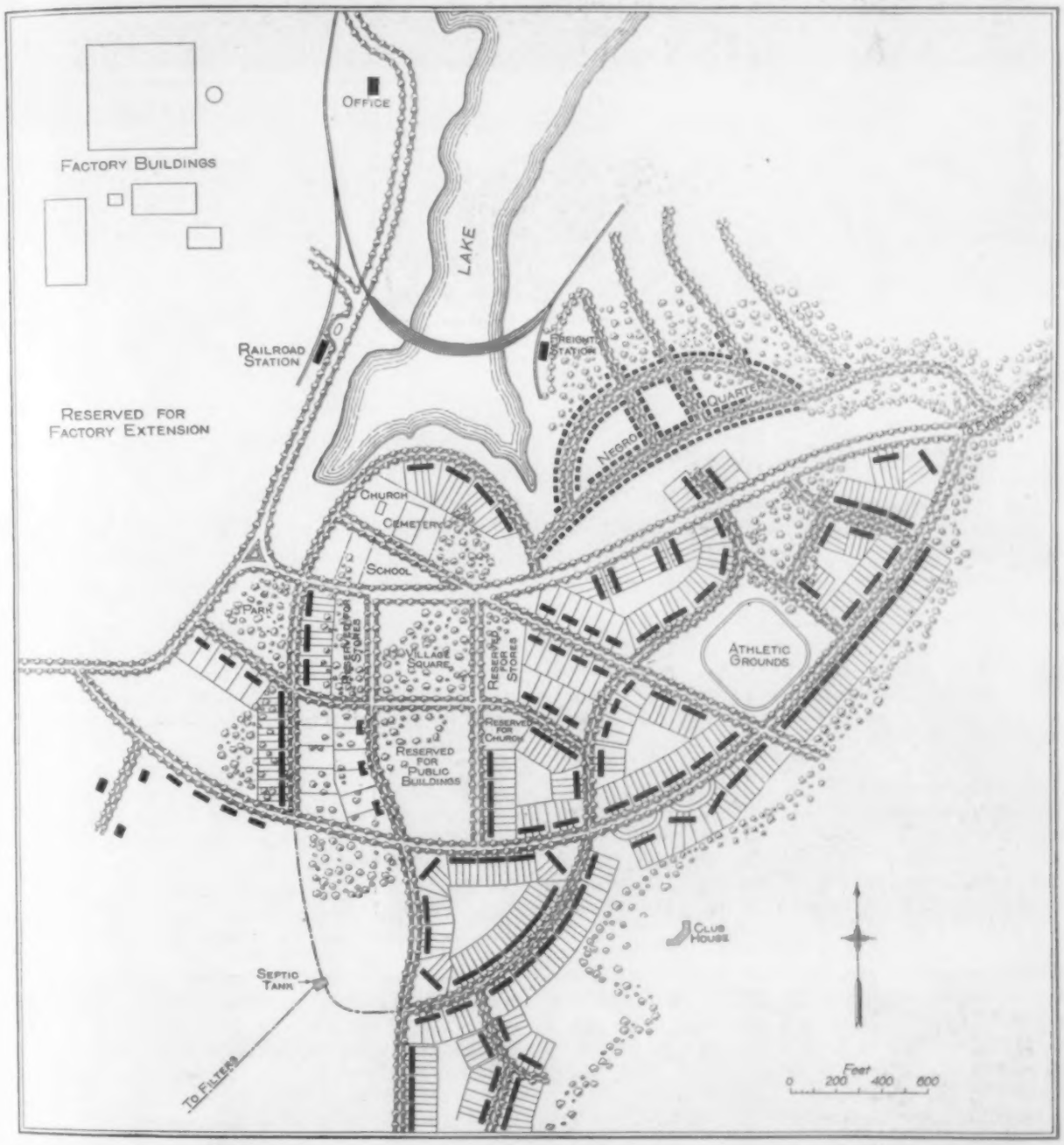


Standard Floor Plans of the Workmen's Houses. All Variation in the Plan Has Been Made by Increasing the Depth of the Houses by the Addition of One or of Two Standard Stud Spacings. In the Case of the Six-room Houses the Depth is Great Enough to Allow the Porch to be Set In. On the Second Floor the Increased Depth Allows for More Bedrooms

for a double-track trolley, with 16-ft. roadways on each side, parking strips, etc.

The sewer system is what is known as the separate system, because the surface water is kept out of the sewers. The sewage is collected in the mains and runs by gravity through a septic tank with spraying coke filters for the subsequent sewage treatment. This, it is emphasized, makes the upkeep economical, as there is no machinery to wear out and no supplies are required.

The water system is designed with a minimum

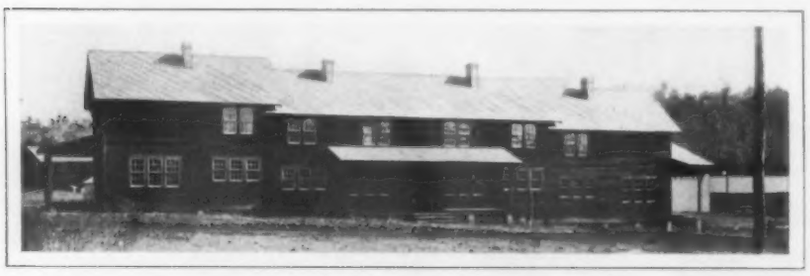


The Town of Badin, N. C., Built for the Southern Aluminum Company to House Its 3000 Employees, by Pierson & Goodrich, Inc.

12-in. penstock supplies water to the turbine, which makes the water supply independent of the main power plant. Another important factor of safety exists through cross-connecting the raw-water main that runs from the river to the factory with the filter-water main, so that if by any chance the 250,000 gal. storage tank should be emptied, raw water can be run into the street system as an emergency.

The buildings, most of which have already been constructed, consist of a fireproof general office building, a clubhouse for the unmarried office staff, executive houses for the resident executive officers and department heads, foremen's houses, workmen's houses of three different sizes, and negro cabins, all electrically lighted. The general office building is a substantial fireproof brick structure with all the latest conveniences. The clubhouse, of plain construction and fireproof roof, has an entrance hall, library, billiard room, dining-rooms, kitchen, pantry and servants' dining room on the first floor; 23 bedrooms with bathrooms and showers on the

main of 6 in. Hydrants are placed to make it possible to get three streams of water on any point of an interior block with not over 1000 ft. of hose in any line. The water supply is pumped from the Yadkin River by turbine-driven pumps, placed in the power house below the dam. It is pumped to a 100,000 gal. tank. Thence by gravity it goes through a coagulating basin and quicksand filter of 500,000 gal. daily capacity, to a 250,000 gal. storage tank, and from there into the mains. The pressure varies in the town from 40 to 60 lb. A



Housing Arrangements

At the top of this page is shown a group of the houses for the white employees and at the top of the facing page the negro quarter, with classified building materials cut to size in the foreground beside a temporary railroad siding.

Five of the six smaller views are workmen's houses, each comprising four units or homes set side by side. Three types of the four-room house, on the left-hand page, illustrate the variation in the roofs and porches to avoid monotony in appearance. The first of these three occupies a level plat and the other two show how buildings have been

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second and third floors. Two tennis courts and ample space about the building are provided for outdoor recreation. The company reserves two rooms for guests.

The executives' houses are seven to ten room dwellings on large lots, equipped with steam heating and all other conveniences. The foremen's houses are twin or semi-detached houses, each half seven rooms and bath, with hot-air heating and fireproof roofs.

The workmen's houses are frame with fireproof roofs. There are three designs or units, comprising living room, kitchen, two, three or four bedrooms respectively, and a bathroom. Four units of the same design are combined into one building. The front and rear dimensions of all

for Factory Employees

fitted to slopes of different pitch by steps between the units. On the right hand page is a five-room workmen's house stained brown and a six-room house stained gray, with porch set in because of the greater depth. Immediately below is one of the negro cabins, all built in pairs with entrances at each end to give the greatest possible privacy.

At the bottom of the left-hand page may be seen a street of foremen's houses, showing how attractive natural conditions have been preserved, and at the bottom of the right-hand page is one of these houses, which are double, accommodating two families.

three units are the same, the variation in size being attained by changes in depth. Variation in appearance is obtained by changes in design of roofs and location of end windows and porches. All the framing was cut at the mill and plans and lists were used for erection. No cutting or laying out of framing at building site was necessary. The usual delays and mistakes in erection were reduced probably to one per cent. of what they usually are. After a foreman had framed one or two buildings, he could generally frame similar buildings from memory. It is related that the engineer in charge heard a foreman ordering material from memory, saying "Get me a piece 14 ft. 3 in. That goes there."

An Executive's House

The interiors are finished with moisture-proof wallboard, painted with washable flatcoat paint. This finish was decided upon after much consideration, and is an important economy, for the reason that the interior repairs in houses of this character are always expensive, and repairs to the materials selected can be made much more cheaply than to plaster or other finishes. A standard framing plan was adopted, studs were all spaced 16 in. centers and wallboard was all cut 31½ in. A stock of such wallboard in standard sizes and painted one of the three or four different shades of interior finish adopted, is held in reserve for repairs. The outside of the houses is stained with creosote stain, not painted. Most of them are colored brown; but for the sake of variety two groups at either end of the town are stained an agreeable gray. Every unit is equipped with a complete bathroom, kitchen sink, range and hot-water boiler.

The negro cabins are built in pairs, each unit consisting of a living room, bedroom, kitchen with range and sink, and an anti-freezing water closet, opening on the rear porch, thus facilitating daily inspection without entering the cabin. It is essential that inspection of sanitary conditions among these people be made without notice or difficulty.

In building negro cabins throughout the South the framing is put up, interior wood ceiling is nailed inside and clapboards outside. When these materials shrink and curl, cracks are opened up, letting in the cold. In constructing the negro cabins in this case, the studs were finished four sides, the ceiling nailed on the outside, then a layer of water-proof building paper and finally the clapboards. This construction costs the same as the usual finish, but has proved itself absolutely weather-tight.

In the construction of the buildings standard plans were used, pieces were cut to size and a mill erected for the special purpose. In locating the town, as has been stated, streets were laid out according to the topography, which enabled the construction of a gravity sewer without any deep cuts. Grading was eliminated in constructing the buildings by facing the houses somewhat at an angle to the street, wherever by so doing cut and fill could be avoided. This fitting of buildings to conform to the landscape went a long way to preserve the natural beauty of the location.

Group dwellings, which are characteristic of the town, were selected in preference to separate housings generally used in this country. In the separate house system the average house built upon a 30-ft. lot allows about 10 ft. of space between neighboring walls. Such an arrangement gives only limited sunlight and ventilation, and the closeness of the dwellings with facing windows universally stimulates an unhealthy curiosity and quarrels, and tends to lower the moral standard of the community. Therefore good practice requires 50-ft. lots. In group buildings, on the other hand, the windows do not face each other. This promotes privacy. Unlimited air and sunlight are available in every room and porches are for the most part separated. This arrangement also allows dwellings to be built on 30-ft. lots, whereas, by separate housings, 50-ft. lots are required to conform to the fire underwriters' requirements.

Many other economies were attained. For instance, in the 4-unit building three partitions replace six exterior walls. This reduction of frontage, and the fact that one lateral from the sewer was used to serve two housing units, made a saving of about 40 per cent. in the cost of sewers. A similar arrangement of the water main and feeders gave a saving in the cost of water installations of like amount. The same factor made a saving of 40 per cent. in street improvements, sidewalks, etc. Bathrooms in adjoining units use one vent and one lateral, thus saving about half the cost of laterals and plumbing roughing, for both waste pipe and water supply. One economy, finally, which cannot be measured in dollars and cents, but which has a great deal to do with the employee's welfare, and therefore his efficiency, is the esthetic and artistic arrangement of the community.

The Pouring of Babbitt Metals

In a treatise on the pouring of babbitt metals the Syracuse Smelting Works, 149 Jewel street, Brooklyn, N. Y., offers practical suggestions of value to engineers.

The following advice is given as to pouring: "Better service will be obtained if you will learn that it is of utmost importance to pour babbitt metals at low temperature." This is explained by the fact that a metal poured at high heat will be brittle and open-grained. The cast liner will be tougher and denser in proportion to the reduction in heat. Another good suggestion offered is: "When practical, take the chill off the mandrel and shell by warming, as this will dry off the moisture which causes blowholes and also make the metal flow better."

On the subject of remelting metals, the treatise says: "Instructions are generally given to stir before pouring. Those who give these instructions intelligently do so because the tendency is to pour metals too hot and the stirring lowers the heat." This dispels the idea, which many engineers have, that the purpose of stirring is to reunite the separated alloy. To determine whether the melted metal needs cleaning, it is advised that the surface of the metal be examined while it is at a fair pouring heat. If fine spider-web lines appear on the surface after skimming, the metal is clean; if the tell-tale lines are not there, the metal requires a Turkish bath. A number of other valuable pointers are given, and the Syracuse Smelting Works will, no doubt, welcome inquiries from those interested in bearing efficiency.

The U. S. Reduction Company, Chicago, calls attention to the great advance in values of constituents of babbitt metal within the past few months. The company states that when it secured its U. S. trademark on its Advance anti-friction babbitt, and put the metal on the market, the mixure was based on the following prices: Tin, 30c. per lb.; antimony, 7c.; lead, 4c. Prices paid last week on the same mixture were as follows: Tin, 55c.; antimony, 26c.; lead, 4.05c. The company states, however, that it will not change its original price of 10c. per lb. on this product even if tin and antimony should go much higher.

THREE NEW WELDING MACHINES

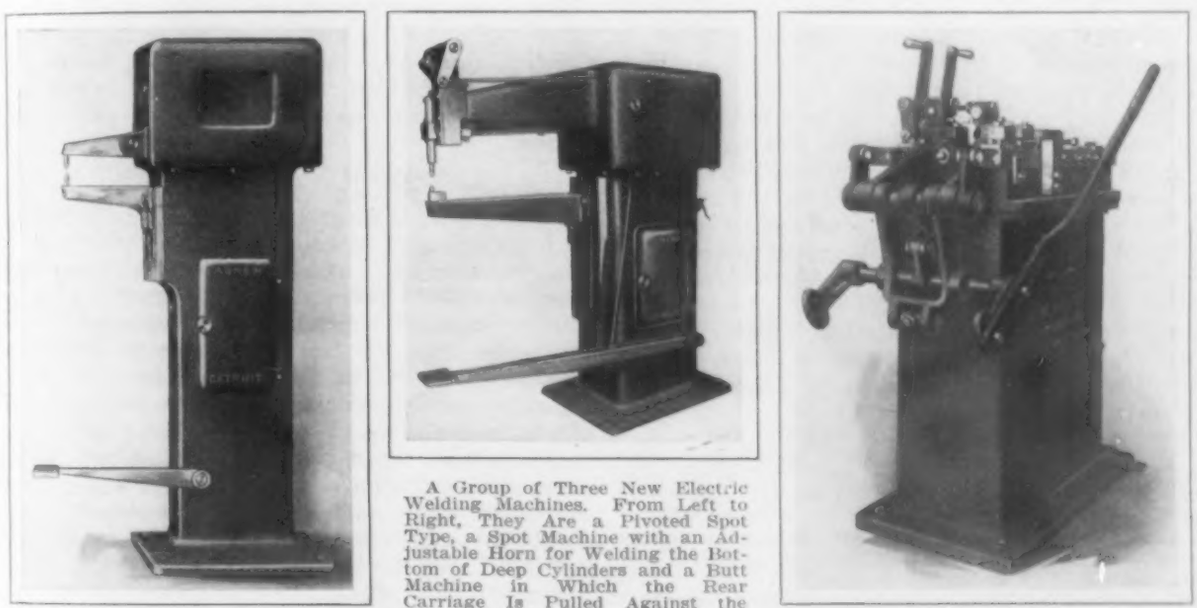
Water Cooling of Dies and Inclosing of High-Tension Wires Two Features

A new line of electric welding machines has recently been brought out by the Agnew Electric Welder Company, Detroit, Mich. The most important types are two spot welders and a butt welding machine. An important feature of both spot welding machines is that the working points are water cooled by hose and pipe inside the machine underneath the transformer. The high-tension wires are also housed inside the frame so that accidental contact with them is impossible. The regulating panel is inside the frame, access to it being through the door on the side of the frame. All working parts of both types are accessible and designed for hard service.

The smaller or No. 10-D machine is of the pivoted type. As it is equipped with a foot lever only, which automatically applies the current, the operator has free use of both hands. A regulating switch for welding any thickness of metal within its capacity of No. 18 or 14 gauge steel is provided. The depth of the throat is 10½ in.; the adjustment of the lower horn, 6 in.; hight from floor to work points, 41 in., and transformer capacity, 12½ kw. This machine will make 500 welds on No. 18 gauge; 900 on No. 22 gauge; 1500 on No. 26 gauge, and 3000 on No. 30 gauge steel with a current consumption of 1 kw.-hr.

The larger type of spot welding machine, the No. 20-D, has an adjustable horn so that with the use of a long point welds can be made at the bottom of deep cylinders, battery and tool boxes, etc., and the horn is arranged so that any kind of attachment can be put on it for welding on the inside of odd shaped pieces. In this machine the up and down movement of the upper electrode is secured by toggle joints. It is regularly equipped with a foot lever which automatically applies the current, but a hand lever may be attached if desired. Regulation is provided so that metal of light thickness may be welded without danger of burning. The transformer is designed for continuous and rapid service up to its capacity without overheating. Its welding capacity is No. 10 gauge steel and lighter. It is made in four sizes with depths of throat of 18, 24, 36 and 48 in. The adjustment of the horn is 10 in. and the hight from the floor to the working points is 40 in. The transformer capacity is 20 kw. The machine will make 160 welds on No. 10 gauge steel; 350 on No. 16 gauge; 900 on No. 22 and 2250 welds on No. 28 gauge steel with a 1-kw.-hr. current consumption.

The butt welding machine, designated as the No. 20-C, has a number of special features including an extended movable rear carriage which is pulled against the work instead of being pushed, to prevent any tendency of the work to buckle under heavy pressure. The carriage slides in ways located at the front and rear of the opening. The extended movable carriage adds to the rigidity and allows the bearings to be located so that particles of chilled metal cannot get to them and cut the bearings. The movable carriage is gibbed to take up the wear. The forward carriage is adjustable vertically and crosswise, making it unnecessary to shim or remachine this to correct alignment. The necessary pressure is applied by a vertical lever operating a compound toggle movement that is adjustable to secure the greatest leverage at any desired position of the carriage. A second lever is attached on the rear and the machine is operated by two men, avoiding the necessity of using a hydraulic ram on heavy work. It is equipped with clamps for welding either rounds or flats. A current regulator and water cooled dies form a part of the equipment. The machine illustrated has a welding capacity of ½ to 1¼ in. rounds or ⅛ x 7-in. flats. The stroke of the carriage is 4 in. and the carriage opens 4½ in. The hight from the floor to center of work is 42 in.; the floor space is 22 x 34 in., and the transformer capacity is 30 kw. This machine will make 11 welds on 1¼-in.; 18 welds on 1-in.; 38 welds on ¾-in., and 135 welds on ½-in. round bars with a current consumption of 1 kw.-hr. It is also built in three other sizes, two smaller and one larger.



A Group of Three New Electric Welding Machines. From Left to Right, They Are a Pivoted Spot Type, a Spot Machine with an Adjustable Horn for Welding the Bottom of Deep Cylinders and a Butt Machine in Which the Rear Carriage Is Pulled Against the Work Instead of Being Pushed.

How a scaffold in a blast furnace may be removed is explained by Alfred O. Cochrane in a recent contribution to the Proceedings of the Cleveland Institution of Engineers (England). Having located the side of the furnace on which the scaffold is held, coke is charged on the opposite side. This gradually sinks below the scaffold and as it burns melts and removes the obstruction.

The Properties of Swedish Wrought Iron

The Process of Manufacture Described—A Comparison with Soft Steel in Adaptability to Various Uses

BY NILS LILIENBERG*

The question of the real nature and actual position of Swedish iron has come up for discussion from time to time, and inasmuch as some erroneous impressions apparently prevail among some buyers, it is proper that some consideration be given to this subject. The nomenclature ought to be defined to facilitate transactions and to avoid misunderstandings. At present a variety of names is given to this material, such as Norway iron (frequently abbreviated to the word Norway), Swedish iron, Swedish charcoal iron, Swedish Lancashire iron, Swedish dead soft charcoal metal. It is about time that the word Norway should be eliminated, as that country can only produce iron on a very limited scale, owing to lack of charcoal.

The designation "Swedish Lancashire iron" is also antiquated, as it is a very long time since Swedish iron-making had anything to do with Lancashire in England, which has a large iron production of its own. In some cases confusion has really arisen and the buyer did not know whether his iron would be made in Sweden or in Lancashire, England. Although this, of course, shows ignorance, it is so far justified that reference may be made to an American Swedish iron, English Dannemora steel, etc.

At the New York congress of the International Association for Testing Materials, in 1912, a committee was appointed to propose an improved nomenclature for iron and steel, and I here give an extract from its report:

Wrought Iron: Malleable iron which is aggregated from pasty particles without subsequent fusion and contains so little carbon that it does not harden usefully when cooled rapidly.

Remarks: Commercial wrought iron, though occasionally made direct from the ore, is usually made from cast iron by such removal of its carbon and silicon as to convert it into pasty particles and by squeezing these together in a bath of cinder or slag into a coherent mass which retains permanently an important quantity of that slag. In Great Britain "malleable iron" is often used as synonymous with wrought iron but some times at the risk of leaving the lay reader in doubt whether it refers to wrought iron or malleable cast iron. Hence we advise against the use of "malleable iron."

THE PROCESS OF MANUFACTURE

As this fits exactly to the practice in Swedish iron-making, it would meet all contingencies and be the simplest to call the product Swedish wrought iron. It is true that this would include puddled iron, but such iron is not exported from Sweden. The Swedish wrought iron is made in a hearth consisting of a box with two inclined tuyeres and open in front. A charge of pig iron, 350 to 430 lb., is laid on the bottom and mixed with charcoal. The pig iron is preferably mottled, with 0.2 to 0.4 per cent silicon, and is selected of sufficiently pure quality to require no dephosphorizing. Through the action of the blast, the pig iron is melted and then the usual process of refining takes place, viz.: the silicon is first oxidized, the silica saturates itself with oxide of iron, forming a basic slag, which reacts on the carbon, developing carbonic oxide which causes boiling.

The resulting low carbon iron having a higher melting temperature than produced in the hearth, forms then into pasty particles which are worked together into a loup. It is especially at that period that most skilled labor is needed. Care must be taken that the iron does not touch coal that is not covered by slag, as it then quickly absorbs carbon.

The work in the hearth, as well as in the heating furnaces, is partly supplemented by mechanical arrangements, thus saving some of the muscular exertion, thereby increasing the efficiency of the workmen and their mental observations.

The loup is taken out and squeezed together under a hammer of sufficient weight to press out the surplus of slag, no rotary or alligator squeezers being used. Even this operation requires great attention and expert workmen, so that, for instance, steely or raw parts are cut off and the loup turned so that the part which was on the upper side in the hearth, and thus most liable to contain raw particles, will form the end and not the side of the bloom.

FROM BLOOM TO FINISHED PRODUCT

The resulting blooms are reheated in a welding furnace, care being taken to regulate the heat so that the slag melts without burning the iron; then they are rolled or hammered, as the case may be.

The amount of work is adjusted according to the purposes. For the best iron no scrap enters the charge in the hearth along with the pig iron, and piling so far as possible is avoided. The billets reduced from the blooms are reheated a second time, in the practice of the best works, before being rolled into merchant bars or rods. This also entails a second inspection and opportunity to throw out inferior parts. The word "double-welded" means that the billets are heated a second time before being rolled to a finish, but it has been erroneously applied to the process of piling. As the structure of wrought iron consists of amorphous elongated lenses of iron regularly separated by thin films of slag (different from undue accumulations of cinder which impair the quality) it is evident that mechanical work (hammering more than rolling) reduces the thinness of these films, thus making the iron fibers approach each other. It is something akin to beating gold leaves.

This work is reduced in making steel iron for remelting in crucibles as the uniform soundness of the structure here is less important. On the other hand, a purer and more expensive pig iron has to be selected for that purpose. Most American steel makers are now satisfied with rough bars, rolled direct from the blooms to the standard size, 3 x $\frac{5}{8}$ in., thus containing an accumulation of cinder. The only difference is then that the steel makers get a correspondingly less amount of iron.

CHEMICAL ANALYSIS

Each brand of Swedish wrought iron is uniform in analysis as it is made from pig iron of unvarying quality, without dephosphorization. It is evident that a dephosphorizing process, depending on a variable temperature and withdrawal and addition of slag, cannot produce wrought iron uniform enough to compare with the Swedish product. Moreover,

*Real Estate Trust Building, Philadelphia.

the slag imbedded in dephosphorized iron contains the eliminated phosphorus, which in remelting and perhaps partly in reheating is liable to be reduced and reenter the iron, while the Swedish slag contains no phosphoric acid.

The phosphorus in Swedish steel iron varies according to the brand from 0.015 (in special cases 0.01 per cent.) to 0.025 per cent. and in blooms, merchant bar iron and wire rods, from 0.025 to 0.07 per cent.

The sulphur in all Swedish wrought iron is lower than in others, viz., below 0.015 per cent. It is a special merit for this material to be low in sulphur, and this partly accounts for its good qualities when worked hot.

The manganese generally runs from 0.05 to 0.10 per cent., the lower limit being held especially for electrical purposes, as this manganese more than others impairs the conductivity. The estimate of manganese can serve as deciding whether in doubtful cases the material is iron or soft steel, as the last named invariably contains more manganese. This is in case of the etching test showing the structure should not be convenient to make.

WROUGHT IRON COMPARED WITH SOFT STEEL

The comparison of wrought iron with soft steel has been repeatedly and thoroughly discussed. Able advocates of both sides have made investigations, the results of which have been published in leading American journals from time to time. In short recapitulation, the controversy moves around the following points:

1. The crystallization caused either by heating above the critical temperature or by vibrations, wherein wrought iron has decided advantage.

2. The brittleness from cold working, which also is in favor of wrought iron.

3. The soundness and uniformity of composition. In this respect the soft steel suffers from the possibility of segregation and compressed blowholes and pipe, while the wrought iron, although more uniform in composition, depends for its soundness on the manual labor and care bestowed in the working.

4. The corrosion when exposed to moisture. The arguments have been most detailed on this point and scientific men have made extensive investigations. It is claimed by the advocates of soft steel that the smaller resistance to corrosion depends on the streaks from compressed blowholes, and that absolutely sound soft steel is fully up to the mark in that respect. The preponderance of opinion is, however, that in soft steel, even in this respect, the manganese is hurtful.

5. The ultimate strength and resistance to wear wherein wrought iron has to yield precedence to steel unless worked cold.

6. The electrical conductivity, wherein wrought iron generally takes the lead, especially on account of its low percentage of manganese.

7. The welding properties, in which wrought iron also is ahead for well known reasons.

8. The price of basic open-hearth steel is in every case considerably lower than that of wrought iron.

The wrought-iron interests have such able defenders in America that the Swedes so far only need to follow in their wake. It therefore remains for the advocates of Swedish wrought iron to demonstrate its superiority to American refined iron. Unfortunately comparative experiments are lacking except such as each manufacturer makes for his private use. It is to be hoped, however, that sooner or later such comparisons will be systematically made.

THE USES OF SWEDISH IRON

The field of Swedish wrought iron, which is about the oldest of the products now offered in the market, has been from time to time encroached upon. The earliest great inroad was through the making of coke pig iron and the use of the puddling process. The latest and greatest curtailment has been caused by basic open-hearth steel. The steps by which Swedish wrought iron has retreated before that product may be summarized as follows:

1. Tack making, the last hold being the more favorable blue annealing of Swedish iron tacks; this advantage, however, was finally yielded.

2. Horse shoe nails, for which the uniformity of Swedish iron and its longer duration in use before crystallizing have been overbalanced by the greater amount of split nails.

3. Rivet wire below ½ in. for riveting cold in all cases where the brittleness in soft steel thereby caused is immaterial. But Swedish wrought-iron rods still retain part of this trade.

4. Drop forgings for carriage hardware wherein the trade is still divided between the two materials.

There are, however, other fields in which Swedish wrought iron is considered indispensable. Statistics show that it holds its own. In 1913 the importation into North America of this material in blooms and bars had the value of $1,148,675, which is about double that for the year 1909. The special qualities are also emphasized by American specifications providing that no soft steel of even the best quality be mixed with the Swedish wrought iron. The fear that the increasing production of electrical steel in Sweden will be a temptation to mix that material with the iron is unfounded, however. A strict supervision exists in Sweden so that no buyer of Swedish iron need now fear any mixture of soft steel.

In conclusion, Swedish wrought iron is a specialty which no other country has equaled. What remains of its production will live long, and with continued care in the making and by spreading proper knowledge of its quality its market will no doubt increase.

New Snyder Electric Steel Furnaces

The Snyder Electric Furnace Company, 53 West Jackson boulevard, Chicago, is just completing the installation of a second 3-ton furnace for the Otis Elevator Company, Buffalo, N. Y. This furnace will have a basic lining and will be used in the manufacture of refined steel castings. It is expected that it will be running about the middle of April. The Snyder Company is also installing a small furnace for the Niagara Electric Steel Corporation, at North Tonawanda, N. Y. This furnace will be basic lined and will have a daily output of 6 tons of refined steel. In addition to these two furnaces, the company is completing the installation of three different electric furnaces to be used in special chemical work. Another furnace of an entirely different type is being built, which will be used in a new field.

A. W. Henn, of the National Acme Mfg. Company, Cleveland, Ohio, J. R. Corrigan, Cleveland, and W. H. Millspaugh, Sandusky, have purchased the interests of J. J. Dauch and Sidney Frohman of Sandusky and J. E. Huston, of Connersville, Ind., in the Sandusky Foundry & Machine Company, Sandusky, Ohio. In the reorganization Mr. Henn was elected president; W. E. Guerin, Jr., Cleveland, secretary-treasurer and Mr. Millspaugh, general manager. No important changes will be made in the company's line of products, which consist principally of parts for paper mill machinery.

Modern Steels and Their Heat Treatment*

The General Principles Applied to Carbon and Alloy Steels Lucidly Presented and the Advantages Discussed—Case Hardening

BY ROBERT R. ABBOTT

If we make tensile tests on a series of steels of increasing carbon content we find that the tensile strength increases with the increase in the amount of pearlite, but the toughness decreases. The tensile strength of iron is about 40,000 lb. per sq. in. This can be increased by about 700 lb. for each increase of 1 per cent. pearlite.

It is apparent that in order to obtain greater strength in steel without increasing the amount of pearlite, or, what is the same thing, the amount of carbon, we can do at least three things: (1) increase the strength of the iron, (2) increase the strength of the pearlite, or (3) increase the strength of both. Practically, these are reduced to two, because anything which increases the strength of the iron also increases the strength of the pearlite to some extent, because of the iron in it.

This can be accomplished by adding to the steel some element or elements which will alloy with either the iron, the pearlite, or both, and increase their strength. A steel containing this extra element is known as an alloy steel. There are two classes of alloy steels: (1) those in which one or more of the normal impurities are made abnormally large, and (2) those in which one or more elements not normally present are added. To the first class belong silicon and manganese steels. To the second class, which is the more important commercially, belong nickel, chrome, chrome-vanadium, chrome-nickel, tungsten, and titanium steels.

In nickel and chrome steels nickel forms a solution or alloy with the iron which is stronger than iron alone; chromium replaces some of the iron of cementite, forming a carbide of chromium. The pearlite thus formed from the double carbide of chromium and iron is stronger and at the same time more tough than ordinary pearlite formed without chromium. The most widely used nickel steel contains 3.5 per cent. nickel, while the common chrome steel has about 1 per cent. chromium. Such a nickel steel will be about 20,000 lb. per sq. in., and a chrome steel about 15,000 lb. stronger than a simple steel of the same carbon content. At the same time the toughness of the nickel steel will be about the same as that of a simple steel, while for the chrome steel it will be a little greater. It is apparent, then, that the use of an alloying element to increase the strength of steel is better than to use carbon for the same purpose, as the increased strength is not obtained at the expense of the toughness.

CHANGING THE PROPERTIES BY HEAT

Can we not change the relative amounts of the elements or their strength by some process of heating? Consider an 0.20 per cent. carbon steel shown in Fig. 1. If we heat this to a temperature of 1000 deg. F. and suddenly cool or quench it in cold water, neither its physical properties nor its appearance under the microscope have been changed; if we increase the temperature to 1100 deg. F., we will still find no change; nor will we detect any difference until we use a temperature of about 1375 deg. F. Fig. 2 (150 diam.) shows a steel so treated. Comparing it with Fig. 1, we find that the iron is still present and in about the same amount, but the pearlite areas have become more or less rounded.

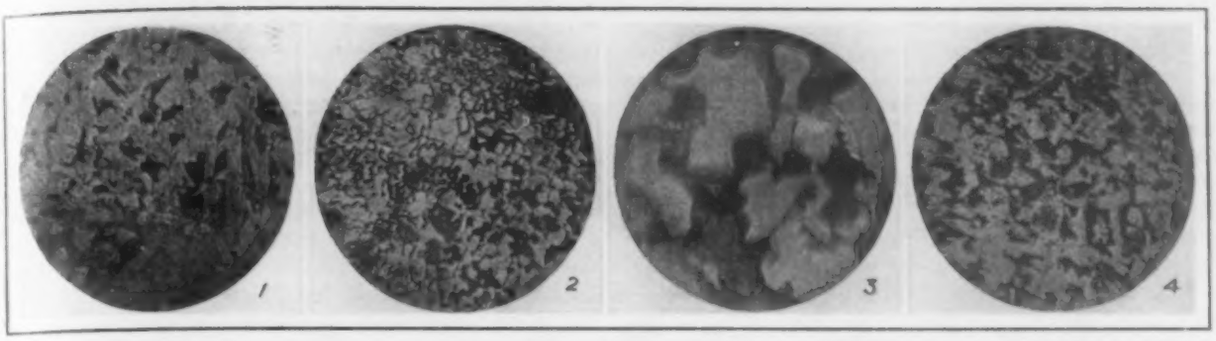
If we examine this structure under 1200 dia. we get one shown in Fig. 3. The white areas are the iron, while the dark areas represent what was originally pearlite. It has now apparently coalesced, so that the original cementite and ferrite of which it was composed have merged into a single substance. The real explanation of the change which has taken place is that the iron which originally composed part of the pearlite underwent an allotropic change at this temperature, and in its new form it is capable of dissolving to a solid solution the cementite with which it was in contact. This new solid solution is known as austenite, and by the sudden quenching time is not given for the reverse allotropic change to occur completely, the transition substance which we really obtain is known as martensite.

A steel thus treated is different from the untreated steel in one of its constituents, and is made up of iron and martensite instead of iron and pearlite. Martensite is much stronger but more brittle than pearlite. We should then expect that our treated steel should be stronger but less tough than the one not treated. The untreated steel of Fig. 1 has a tensile strength of about 55,000 lb. per sq. in., and a reduction in area of 65 per cent. The same steel, heat-treated as just explained, has a tensile strength of about 95,000 lb. per sq. in. and a reduction in area of about 30 per cent. These properties are very similar to those of a high carbon steel containing about 100 per cent. pearlite or 0.90 per cent. carbon. In other words, by a simple process of heat treatment we can obtain with a 0.20 per cent. carbon steel the physical strength of a 0.90 per cent. carbon untreated steel.

Possibly at a still higher temperature we could cause more of the iron to go into such a solution. Fig. 4 (150 dia.) is a photomicrograph of the structure of the same steel quenched from 1440 deg. F. It will be noted that the iron has decreased in amount, while the martensite has increased. Apparently, then, as we raise the temperature we increase the saturation point of the martensite for iron; just as in a water solution we can cause more sugar to dissolve by increasing the temperature, so we can here cause more iron to dissolve by increasing the temperature. At a temperature of 1565 deg. F. all of the iron will go into solution and the quenched steel will consist of 100 per cent. martensite. A higher magnification (1200 dia.) shows the martensite structure to be triangular.

By comparing the series showing increasing carbon contents in different steels with the same steel subjected to an increasing temperature of quenching, it will be seen that they are very similar, in that the amount of iron constantly decreases

*From a paper presented at the joint meeting of the Mining and Metallurgical Section of the Franklin Institute and the American Society of Mechanical Engineers in Philadelphia, Pa., January 14, 1915, and published in the Institute's April Journal. The author is metallurgical engineer of the Peerless Motor Car Company, Cleveland, Ohio.



Photomicrographs of 0.20 per cent. carbon steel reduced one-half from an original diameter of 150 for Figs. 1, 2 and 4 and of 1200 for Fig. 3. Fig. 1 shows the original iron and pearlite of the steel. Fig. 2 shows the same steel quenched from 1375 deg. F., consisting of martensite and iron. Fig. 3 is a higher magnification of a portion of Fig. 2. Fig. 4 is the same steel as Fig. 1 quenched from 1440 deg. F., showing more martensite and less iron than in Fig. 2.

until it becomes zero, while in the increasing carbon series the pearlite increases to 100 per cent. and in the increasing temperature series the martensite increases to 100 per cent.

If we make physical tests on the increasing temperature series, we find that the strength increases, beginning with the temperature of the first change, until final absorption of the iron, while the toughness also increases if the carbon is low. The following table will illustrate this more fully:

Untreated steel			Heat-treated steel, 0.20 per cent. carbon		
Pearlite, per cent.	Strength	Toughness	Martensite, per cent.	Strength	Toughness
25	55,000	65	25	95,000	30
50	75,000	55	50	98,000	40
75	90,000	45	75	100,000	50
100	105,000	35	100	105,000	55

With some steels the best results are obtained by quenching just at the absorption point, while with others a higher temperature is necessary. The metallurgist must know the amount of this variation for different types of steels.

HEAT TREATMENT OF ALLOY STEELS

The heat treatment of an alloy steel is exactly the same in principle as that explained above for plain carbon steels, the alloying elements giving increased strength as well as increased toughness to the heat-treated, in the same manner as it did in the untreated steel.

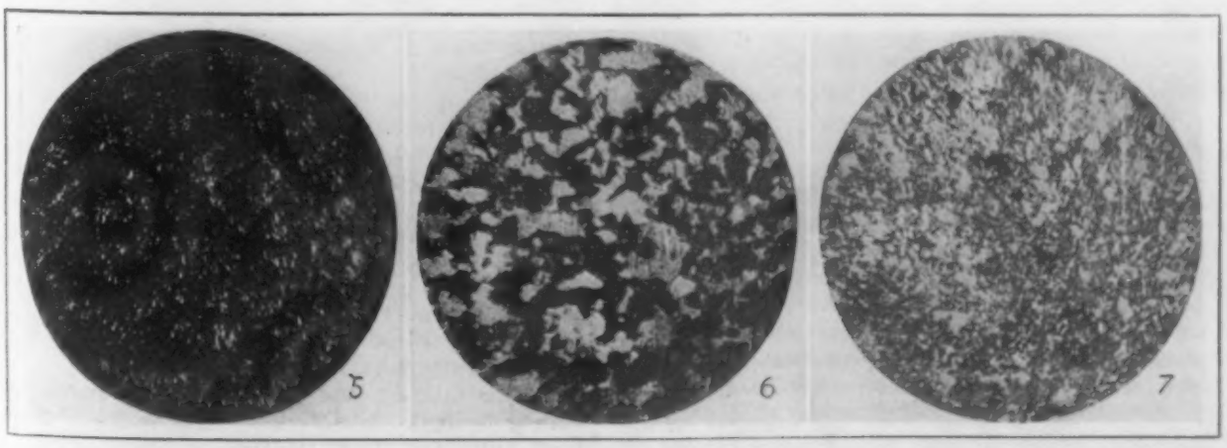
From the foregoing it is apparent that a steel heat-treated to bring out high strength will consist of 100 per cent. martensite, no matter what amount of carbon there was originally present, nor whether alloying elements were there or not. Since martensite is really formed from a solution of cementite in iron, a high carbon steel will form a stronger solution than a low carbon one, just as we can have a strong or weak solution of salt in water. Alloying elements in the martensite do not cause any difference in its structure any more than a little sugar would cause a difference in the appearance of a salt-water solution.

These alloying elements, however, have a very decided influence upon the position of the critical temperature; for example, 0.1 per cent. manganese lowers the upper critical temperature 6 degrees, while it has practically no effect upon the lower critical temperature; 0.1 per cent. Chromium raises the lower critical temperature 4 deg. when nickel is absent, but with nickel present it raises it only 3 deg., but in neither case does it have any appreciable influence upon the upper critical temperature. The business of the metallurgical engineer is to know absolutely the influence of all elements upon these critical temperatures.

In general, these martensites made from a steel containing more than 0.2 per cent. carbon have not enough toughness for their strength, and to remedy this the steel is given a second low heat, commercially known as a drawing heat, which allows a certain amount of transformation to take place in the martensite, and reduces its strength but increases its toughness. By varying the final heat, an unlimited number of combinations of strength and toughness are available.

ADVANTAGES OF HEAT TREATMENT

Broadly summarized, the process of heat treatment consists in transforming an alloy from a mechanical mixture of two substances into a homogeneous solution of a single substance. This very fact gives to a heat-treated steel one of its most valuable advantages over the untreated steel; namely, its ability to withstand repeated shocks or vibrations, or, as it is popularly expressed, "fatigue-resisting power." The reason is obvious: an alloy



Photomicrographs of case-hardened steel reduced one-third from an original diameter of 150 for Figs. 6 and 7 and of 350 for Fig. 5. Fig. 5 shows the effect of a low quench from the hardening temperature. Figs. 6 and 7 show the comparison of the difference in structure of the core of a piece of carbonized steel with a single hardening heat (Fig. 6) and with a double refining and hardening heat (Fig. 7).

composed of two dissimilar substances has mechanical boundaries between them. This fact is a source of weakness under repeated stresses, the reasons for which are more or less complicated. An untreated steel contains these boundaries; a correctly heat-treated steel does not.

There is a still further advantage based upon a different consideration. A steel with a tensile strength of, say, 60,000 lb. per sq. in., if subjected to repeated reverses of stress of any magnitude, will finally break after a definite number of these reversals; as the magnitude of these stresses approaches the actual strength of the steel, the number of reversals necessary to cause a break rapidly decreases; as a consequence of this fact, a comparatively slight increase in the strength of a piece of steel will increase way out of proportion its resistance to fatigue break. Therefore it is frequently desirable to heat-treat a piece of steel to give it an added factor of safety under the shock or alternate stresses, even though its static factor of safety is ample.

TOOL STEELS

In supersaturated steels, those containing more than 0.90 per cent. carbon, we have present cementite and pearlite. Most tool steels belong to this class. In the heat treatment of such a steel the pearlite changes to austenite at the same temperature which we found for an undersaturated steel. As the temperature is raised above this point the excess cementite begins dissolving into this austenite, just as the iron did in a lower carbon steel, until at a definite temperature all of it is dissolved, and we have, as before, austenite. The cementite is more sluggish in dissolving into the austenite than the iron, and the reaction requires more time to complete.

If it is hardened at the lowest possible temperature its pearlite will be changed to martensite, while its cementite will be unchanged, causing the steel to be extremely brittle, and a source of many of the troubles of the steel user.

If we quench from above the upper absorption point we get rid of this cementite, but the steel is somewhat softer because of its absence. The structure of the steel has also been coarsened by the high temperature, which causes it to be brittle. If the coarsened steel is again reheated slightly above the lowest hardening temperature, the cementite will be precipitated out of the solution, but, instead of being in sheets or plates, it will occur as fine dots, which give extremely good wear and have practically no effect of brittleness. A steel thus treated is shown in Fig. 5 (350 dia.). This same arrangement of cementite can be formed by heating the steel to just above the lowest hardening temperature and holding at this temperature for some time.

THE CASE-HARDENING OF STEEL

In the carbonizing process the outer surface of a low-carbon steel has its carbon contents raised by heating in contact with carbonaceous material. The depth of penetration of this high-carbon shell and also the percentage of carbon it contains are functions of the carbonizing material used and the temperature and time of carbonization in general; the outer surface should be a supersaturated steel, and therefore its treatment comes under that of tool steel, which we have just considered.

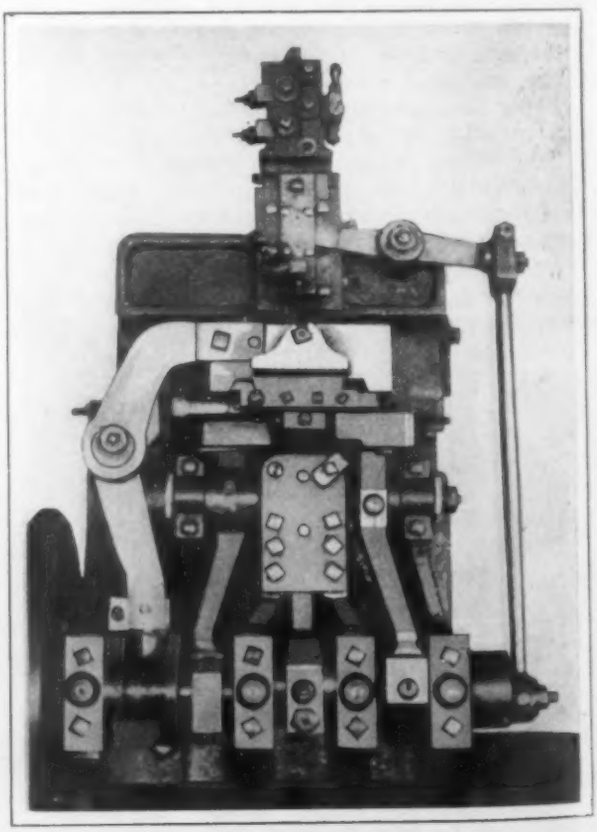
To produce a correctly heat-treated, carbonized article we have four functions to consider: (1) the chemical analysis of the steel; (2) the carbonizing material; (3) the time of carbonization, and (4) the temperature of carbonization. These should be adjusted so that the upper absorption point of the iron of the core shall exceed that of the cementite of the case. Under these conditions, if the steel is quenched from above the absorption point of the core this will be entirely martensitic, and at the same time the cementite sheet or net of the case will be absorbed, so that it will also be martensitic.

In order to obtain the maximum hardness on the surface this cementite must be precipitated, as shown in Fig. 5, by a low quench from the hardening temperature. During this second quench the iron of the core will also be precipitated out in practically the same globular form, with this difference: there being more excess iron than excess cementite in the core, the iron will precipitate in larger particles and will not have the characteristic globular appearance.

A comparison of the difference in structure of the core of a piece of carbonized steel with a single hardening heat and this double refining and hardening heat is shown in Figs. 6 and 7. In both cases we have the same amount of martensite (black) and iron (white) present, but the mixture is much more intimate and fine in Fig. 7 (double quench). This increases enormously the toughness of the finished steel.

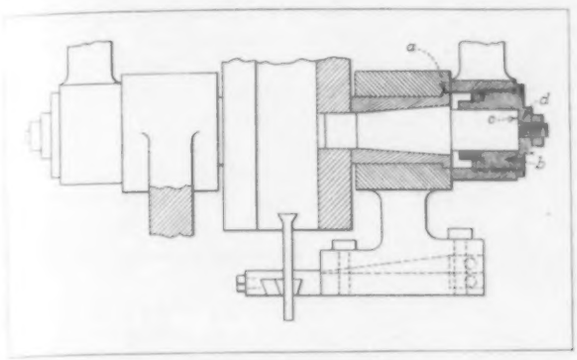
New Machine for Making Wire Nails

A machine for making wire nails which employs an improved type of compensating bearing has been developed by John Fred Pender, St. John, N. B., Canada. In this machine the cutting-off levers have been balanced, and the main operations distributed, each being supported by a bearing on the main shaft close to the point at which the work is done. This arrangement is relied upon to eliminate springing and heating of the shaft and, in conjunction with the substitution of steel forgings for castings for the cut-



Top View of a New Machine for Making Wire Nails in Which the Cutting-Off Levers Are Supported by Taper Bearings on the Shaft Adjacent to the Point at Which the Work Is Done

ting, gripping and feed levers and the main shaft and pitman, is calculated to reduce the time lost through breakdowns. The cutting levers are mounted on the main shaft, one on either side of the header, and are supported by bearings, located adjacent thereto. The pins on which the cutting



Sketch Showing the Arrangement of the Bearing Used

levers turn are adjusted for wear by a special type of bearing.

The bearing used is of the compensating type and consists of a pin, on which the arm, lever or other part to be supported is mounted, so as to be capable of rotation. The pin has a tapered portion, and the bearing boss of the part which it supports is formed to correspond to the taper of the pin, this being secured by the use of a bushing which is tapered internally. A flange, *a*, is formed at one end of the bushing and enters a groove in one end of the boss and bears against the shoulder thus formed. The end of the pin, that shown at the right in the accompanying line drawing, passes through an adjusting bushing, *b*, which is screw-threaded within the frame. This bushing has an internal shoulder, *c*, and a hexagonal head, *d*. The extreme end of the pin is reduced to form a shoulder and is threaded to receive a nut and lock nut. When the connection between the pin and the bearing becomes slack through wear of the parts, the adjusting bushing *b* is screwed by means of the head *d* into the opening provided and by engaging the shoulder of the pin forces the latter longitudinally in the direction of its taper. The movement of the pin in this direction takes up the slackness between it and the bushing, due to its gradually increasing diameter, and is relied upon to tighten the connection. The opposite end of the pin is straight and a space is left between the tapered portion and the adjacent surface of the frame piece to permit of longitudinal adjustment of the pin, the opening being of sufficient width to accommodate the movement of the pin.

When this bearing is applied to a wire nail machine, the cutting-off levers, it is emphasized, can be adjusted so that the cutter bars will be maintained in perfect alignment. In this way the bearings can be adjusted to take up the wear to which they are exposed. In applying the bearing to the wire nail machine the guide for the header bar, which is not shown in the drawing, may be utilized as one of the supporting frame pieces for the pin. A nail machine of this type in regular operation has produced 500 nails from No. 15 gauge wire, 1 and 1⅛ in. long, per min.

The municipal charter of Fellmore, Fla., recently adopted, gives the right to every local corporation to vote in bonding elections through its duly delegated executive.

MICROSCOPIC TESTS OF STEEL

German Investigations at Krupps on Nickel and Other Steels

A beautifully illustrated article on the microscopic investigation of steel by Dr. B. Strauss, director of the chemical-physical testing laboratories at the Krupp plant at Essen, Germany, is contained in Stahl und Eisen for December 10, 1914. The ordinary structures of annealed and quenched carbon steels are first described, including an annealed 0.88 per cent. carbon steel with spheroidal pearlite, that was produced by long continued heating at 730 deg. C. The feature of the article is the splendid photographs in color of heat-tinted specimens, bringing out the value of this method of developing the structure.

SPECIAL NICKEL AND CHROME STEELS

After the ordinary steels the special steels are taken up; for instance, a 5 per cent. nickel steel with pearlitic structure, a 12 per cent. nickel steel with martensitic structure, and a 25 per cent. nickel steel with austenitic structure. These steels are in the annealed condition, and are shown to illustrate the fact that the special element prevents the normal structural changes taking place. Similar structures are shown in the case of chrome-nickel steels, the first pearlitic, with 4 per cent. nickel and 1.3 per cent. chromium, the second martensitic with 4.5 per cent. nickel and 9 per cent. chromium, and the third with 8 per cent. nickel and 6.2 per cent. chromium. This last steel is on the border line between martensitic and austenitic structure. Then comes a steel with 7 per cent. nickel and 20 per cent. chromium that is purely austenitic. These also are in the annealed condition.

While up to the present the pearlitic chrome-nickel steels have found most use in commerce, tests at the Krupp laboratories have shown that the other two classes, martensitic, and austenitic, are distinguished by good physical properties, and resistance to acids and corrosion.

Next come some interesting photomicrographs of steel to which phosphorus was purposely added, so as to determine how it affected the structure. The metal contained 0.22 per cent. carbon and 1 per cent. phosphorus. By heat tinting it was found that an envelope of some iron-phosphorus compound surrounded the pearlite. This compound is very brittle and its position explains the very harmful effect of high phosphorus in steel. A color photograph of a sample of Roman wrought iron with 0.8 per cent. phosphorus shows the same phosphide enveloping a slag area.

A BROKEN LOCOMOTIVE AXLE

Several examples are then given of cases where microscopic investigation has helped to explain failures of material in service. An interesting one is a locomotive axle that had broken at a bearing in service. Naturally the fault was laid on the steel. Careful examinations of sections only showed several small cracks extending in from the surface. A longitudinal section was taken, polished and etched, when a layer of metal near the outer surface was seen to have a different structure from the rest of the axle, and to have vertical cracks running through it. Further examination showed that this outer layer had been highly heated at some time, and this had given rise to stresses that had produced the cracks.

Apart from this change in structure, microscopic investigation disclosed another proof that

the axle had been highly heated in the bearing. Near the cracks were found a great many inclusions of the yellow bearing bronze that undoubtedly had been pressed through the cracks in the molten condition. One of these inclusions is shown in the original paper in natural colors, the bronze firmly united to the steel. Many such cases of broken axles and shafts have been investigated that have shown inclusions of anti-friction metal or bronze.

Mention is also made of the shelling out of tires, and several photographs given. In one case it was due to the steel being too soft, and the cold rolled parts being pushed over by the loads. In other cases very hard braking caused the wheels to slip on the rails. This caused excessive heating of the outer part of the wheel or tire, which, being cooled by the mass of the wheel, brought about hardening of the steel. These hard and brittle places easily break out. Examples are also shown of the non-metallic inclusions to be found in steel, the amount, size, and distribution of which influence the properties of the material. G. B. W.

Export Trade Bulletin

National Foreign Trade is the name of the official bulletin of the National Foreign Trade Council, a four-page paper 9 x 12 in., of which the first number has just been issued. It will be published monthly from the office of the secretary of the council, Robert H. Patchin, 64 Stone street, New York. The object of the publication is the co-ordination of the foreign trade activities of the nation and the encouragement of sound foreign trade policy. The first article in the first issue is on "British Fiscal Policy and the War." It directs attention to the work of the tariff commission in Great Britain, which as the representative of the tariff reform element is advocating the adoption of a tariff for Great Britain to meet the heavy war debt and to protect British industries in their effort to supply the goods heretofore imported from Germany. The movement may support also the extension of tariff preference between the United Kingdom and the colonies. Extracts are given from the official report of the second national foreign trade convention held at St. Louis in January.

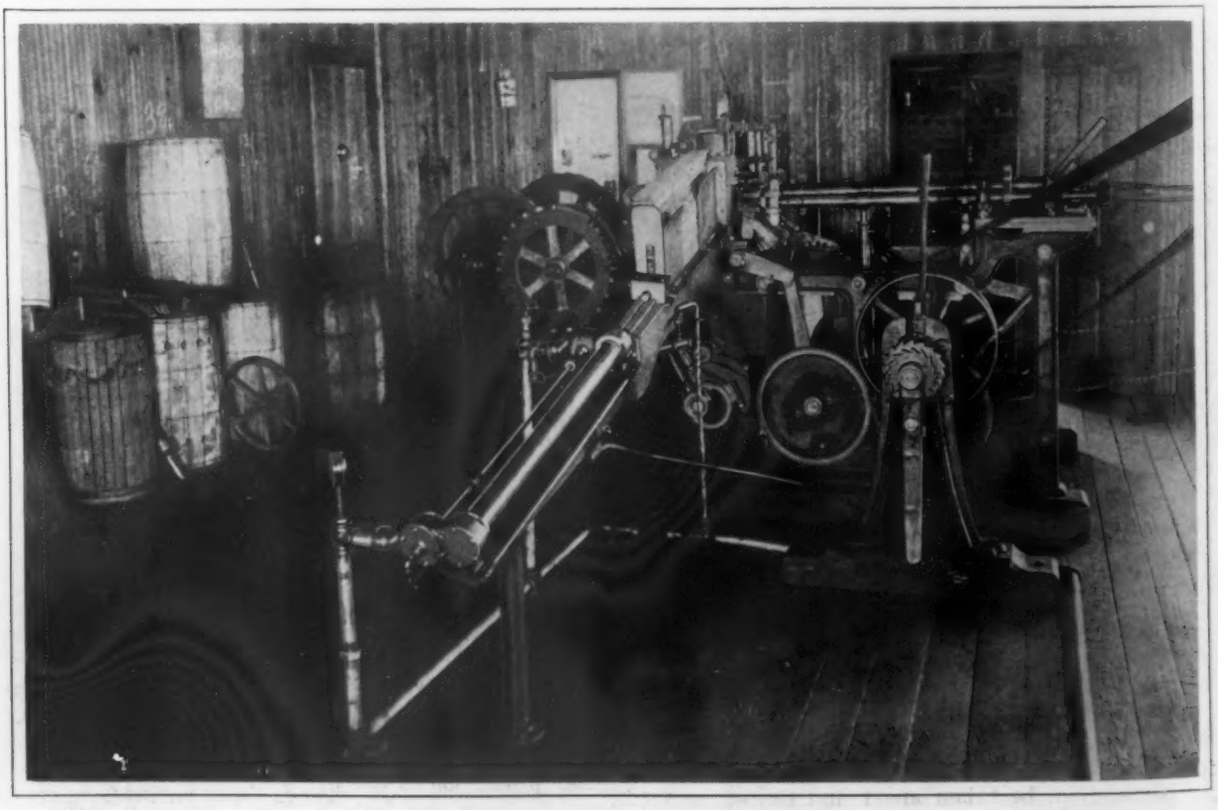
NEW WOODEN BARREL MACHINE

Taking a Pile of Flat Staves and Delivering a Completed Barrel Per Minute

Under patents granted E. W. Robinson, the International Barrel Company, Savannah Bank & Trust Company Building, Savannah, Ga., is building a new type of machine for making wooden barrels and kegs. One barrel is turned out complete in 1 min., or three standard 9-in. nail kegs can be produced in the same time. Flat staves of the same thickness throughout their entire length are used, and emphasis is laid upon the fact that it is not necessary to cut away the ends of the staves to admit the head and keep it in place. This is accomplished by the use of two wires, one on the inside of the barrel, upon which the head rests, and one on the outside, as shown in the accompanying drawing. The staves forming the sides of the barrel are held in place by a series of wires or sheds passing around the staves.

In operation the staves are placed one above the other in a pile, as shown in the accompanying halftone and are fed into the machine by a pneumatic feed bar. This bar is limited in hight with a view to engaging the bottom stave only, and after a stave has been deposited in the guideway the bar is retracted prior to the insertion of the stave between the bilging bridges and into the sheds or wires by the action of the pusher slide. In this way, it is pointed out, that it is practically impossible to insert two staves at one time or jam the machine. When the proper number of staves has been fed into the machine, the feeding mechanism is stopped until the desired number of twists in the wire between the successive barrel blanks has been formed.

Inclosed mortises in the forward edge of each stave are used for the wire and are formed by a series of drills. This is caused by the feed bar forcing the stave against the drills, and the drills



One Side of a Recently Developed Machine for Making Wooden Barrels Automatically, Showing the Pile of Staves Ready for Feeding

are freed when the feed bar is retracted to its normal or stave guiding position.

The twisting spindles for the pairs of wires are mounted in bearings on the fixed frame of the machine and are geared together so as to rotate in unison. Each of the twisting spindles is tubular for the passage of the pair of wires and each spindle carries at its forward end a twister head having a pair of forwardly projecting jaws mounted pivotally on it. The wires pass through openings in each spindle, thence around rollers at the end of the twister head and finally through openings at the forward end of the jaws. A flaring head serves to press the wires against the bevel seat at the rear end of the spindle, an arrangement which is relied upon to give the proper tension to the wires during the twisting process.

A Sectional View of a Portion of a Metal Bound Barrel Showing the Way in Which the Head Is Kept in Place

Three dogs are used for driving the staves into place, one being located at the center, with the others midway between the center and the ends. Each dog is operated independently of the others, so that the stave, instead of being pushed forward in a straight line, will be advanced first at one end, then at the center, and finally at the opposite end, thus distributing the strain exerted upon the dogs in jamming each successive stave up against the one previously inserted, instead of concentrating it upon all three dogs at once. The travel of these dogs can be varied to compensate for different widths of staves that may be employed in the fabrication of the barrel.

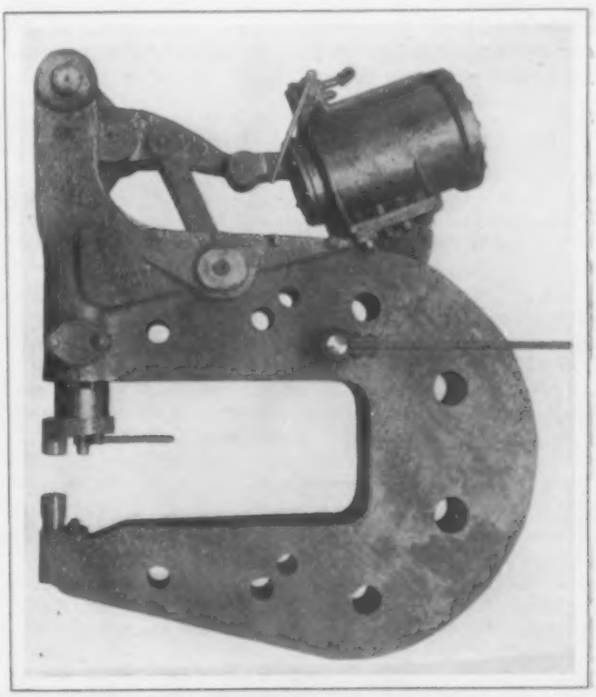
When the stave has been driven in place the upper bilging bridge descends to press the wires tightly against the opposite faces of the stave and hold them in this position during the twisting operation. As the formation of the barrel blank proceeds the rearmost stave is gripped firmly between a pair of clamping jaws which hold it while the freshly inserted stave is being pushed in place. After this has been done they advance the barrel blank the width of a stave, release their grip and are moved back to repeat the operation.

After the barrel blank is completed and the junction wires formed, the latter are automatically severed by a shear for each wire, and the barrel blank is delivered to a conveyor and taken to a second machine in which the bottom is inserted. When the barrel is filled the head is forced in against the inner wire, after which the outer wire and the metal clamping band are put in place, the outer clamping band being held in place by two staples. For use with materials where it is necessary to protect the contents of the barrel from moisture, a paper lining is inserted, which it is emphasized is not torn by any inwardly projecting nails. The barrel can also be used to furnish protection to metal drums for shipping liquids, etc., and where it is used it is pointed out that the lighter gauge material can be used, thus reducing the weight and the freight charges. If desired the empty barrels can be taken apart and nested, and the heads shipped in a separate package.

A 100-Ton Pneumatic Riveting Hammer

The Hanna Engineering Works, 2059 Elston avenue, Chicago, Ill., has brought out a 100-ton pneumatic riveting machine which has a reach of 48 in. and a 24-in. gap. Among the characteristics of the machine are the application of the rated pressure of the machine through a comparatively large amount of die travel, a slow movement of the die, which it is emphasized gives the metal in the rivet time to flow and fill the hole completely, and the use of a flush top arrangement, which permits angle connections to be riveted on plate metal as close up as 2 in.

The machines are furnished with cylinders having a piston stroke of 22 in. and a 6-in. travel of the rivet die. The toggle action takes place during the first half of the piston travel, this 11 in. representing approximately the first 5 in. of the die travel. At this point the mechanism automatically changes into a simple lever action without a critical point, and for every inch of the last 11 in. of piston travel, the rivet die will move forward 1/11 in. or a total of 1 in. over the last half of the piston travel. It is pointed out that in this way a careful adjustment of the die screw is not required on account of the considerable distance through which the rated pressure is exerted, and also there is no need to strike a rivet more than once, as the rivet is set with a predetermined known pressure at each blow.



A 100-Ton Pneumatic Riveting Hammer Having a Combination Toggle and Lever Action

The slow movement of the die during the lever action, it is emphasized, gives ample time for the metal in the rivet to flow and fill the hole completely, as well as affording an opportunity for the rivet to set before the pressure is completely released on the return part of the lever action. Cold rivets can be driven, as the motion automatically slows up during the lever action and gives the metal time to flow.

Ten carloads of iron ore were shipped last week from Baraboo, Wis., to Chicago, marking the commencement of regular ore shipments from the Cahoon mine, near Baraboo. The work of preparing the mine for the regular production of ore has been going on for more than five years and last fall the Chicago & Northwestern laid tracks to the property.

Low Carbon Pig Iron for Iron Castings

German Tests Show How the Use of This Iron in the Charge Improves the Properties of the Castings

A further contribution on the use of low carbon pig iron in iron castings has appeared in Stahl und Eisen; in it A. Geissel describes "Test Results Obtained with the use of German Low Carbon Pig Iron." This paper should be considered as a continuation of a previous one by A. Zenzes, the translation of which appeared in *The Iron Age* of February 26, 1914. In the latter paper it was shown how the Germans had made themselves independent of English cold-blast charcoal pig irons like Frodair, Coldair, etc., by perfecting a process of producing a low carbon pig iron which satisfactorily replaced the excellent English iron.

Table 1.—Results of Tests with Square Bars, 30 x 30 mm. (1.18 x 1.18 in.) the Charges of Each Heat Containing 15 Per Cent. of the Low Carbon Iron

Heat No.	Bar No.	Transverse strength, lb. per sq. in.	Deflection, in.	Tensile strength, lb. per sq. in.	Elongation, per cent.	Compression strength, lb. per sq. in.
1	1	59,960	0.37	37,550	0.5	.....
	2	58,460	0.37	35,410	0.5	.....
	3	56,820	0.40	36,410	0.75	.....
	4	54,900	0.40	32,000	0.5	.....
2	1	54,470	0.39	.....	...	.....
	2	56,890	0.39	.....	...	.....
	3	57,320	0.39	.....	...	.....
	4	57,320	0.39	.....	...	.....
	5	.....	...	37,550	0.5	135,120
	6	.....	...	39,970	0.5	.....
	7	.....	...	37,120	0.5	139,100
	8	.....	...	38,120	0.5	.....
3	1	54,050	0.31	36,550	0.5	.....
	2	55,470	0.33	37,690	0.75	.....
4	1	52,340	0.37	29,720	0.5*	.....
	2	50,490	0.37	32,570	0.5	.....
	3	.....	...	35,270	0.5	.....
	4	.....	...	34,850	0.5	.....
5	1	52,060	0.35	33,850	0.5	119,190
	2	53,340	0.35	33,420	1.0	118,900
	3	.....	...	33,140	0.5	.....
	4	.....	...	33,280	0.5	.....
6	1	62,100	0.31	34,280	0.5	.....
	2	61,630	0.31	32,430	1.0	.....
	3	40,680	0.24	36,840	0.5*	.....
	4	59,250	0.31	35,700	0.5	.....
7	1	60,690	0.27	35,840	0.5	.....
	2	60,690	0.27	34,560	0.5	.....
8	1	57,360	0.33	34,850	0.5	.....
	2	59,740	0.35	37,120	0.75	.....
9	1	57,360	0.29	39,970	0.75	127,870
	2	55,940	0.29	37,400	0.25	127,720
10	1	68,270	0.37	37,830	0.5	136,260
	2	60,680	0.33	36,550	0.5	132,560
11	1	57,360	0.33	35,560	0.5	.....
	2	58,600	0.31	35,270	0.5	.....
12	1	51,420	0.32	33,280	0.5	124,030
	2	54,520	0.31	36,130	...	.....
13	1	58,640	0.41	40,680	0.5	143,510
	2	60,450	0.42	39,400	0.5	.....
14	1	53,760	0.33	36,270	0.5	135,550
	2	53,330	0.33	29,440	...†	.....
15	1	52,200	0.32	33,420	0.5	.....
	2	51,630	0.31	28,590	...	.....
	3	54,620	0.34	33,000	0.5†	.....
16	1	54,670	0.39	.....	...	.....
	2	54,370	0.41	.....	...	.....
	3	53,790	0.39	.....	...	.....

*Porous. †Not guaranteed.

Extensive tests have been made with mixtures containing this low carbon iron, including transverse, tensile and compression tests. The test bars were required to be 30 x 30 x 800 mm long (1.18 x 1.18 x 31.5 in.). They were bottom poured in groups of four, upright, in dried molds. From each cast different lots of four were poured, and of these one bar was used for transverse and another for tensile testing. The transverse tests were made on supports 600 mm apart (23.62 in.). The tensile tests on the bars turned down to 20 mm diameter (0.78 in.). For the compression tests cubes were prepared from the square cast bars. The results on 16 heats are given in Table 1, and in these charges 15 per cent. of the low carbon iron was used. Analyses of bars 3-1 and 3-2 gave the results shown in Table 2.

Table 2.—Analysis of Bars from Heats with 15 Per Cent. Low Carbon Iron

Total carbon, per cent.	Silicon, per cent.	Manganese, per cent.	Phosphorus, per cent.	Sulphur, per cent.
3.42	1.51	0.90	0.37	0.091
3.44	1.47	0.97	0.35	0.102

The average transverse test result is 56,600 lb. per sq. in. excluding sample 6-3, which was porous. The average tensile strength is 35,815 lb. per sq. in. excluding sample 4-1, which was porous; and samples 14-2 and 15-2, during the testing of which the machine was not run properly. These results fully met expectations, and exceed the requirements by 20.6 per cent. in the case of the transverse test and 12.72 per cent. in the tensile test. The average compression strength is 130,900 lb. per sq. in.

By the use of round test bars, 30 mm diameter (1.18 in.), the results would have been better, as the structure would have been finer and the ratio of combined to total carbon more favorable. Experience has shown that the results would have been in the ratio of 1:1.2. To confirm this bars were cast on Heat No. 1, 30 mm diameter, and tested transversely on supports 600 mm apart. The results are shown in Table 3.

Table 3.—Results of Tests of Round Bars

No. of bar	Transverse strength, lb. per sq. in.	Deflection, in.
6	69,980	0.49
7	64,860	0.49
8	68,130	0.44
9	69,690	0.44
Average	68,165	0.46

Tests were also made on square bars 40 x 40 x 800 mm long (1.575 x 1.575 x 31.5 in.), using the same percentage of low carbon iron in the charge.

The results are given in Table 4, the average transverse test result being 45,200 lb. and the average tensile strength only 25,200 lb. The average compression strength sank to 102,260 lb. per sq. in.

Table 4.—Results with Bars 40 x 40 x 800 mm. (1.575 x 1.575 x 31.5 In.)

Heat No.	Bar No.	Transverse strength, lb. per sq. in.	Deflection, in.	Tensile strength, lb. per sq. in.	Elongation, per cent.	Compression strength, lb. per sq. in.
17	1	46,650	0.29	.....	...	.....
	2	43,660	0.29	25,170	0.50	101,550
18	1	38,800	0.24	25,890	0.50	.....
	2	39,370	0.24	17,490	0.75	.....
19	1	47,360	0.30	28,730	...	102,970
	2	46,420	0.29	28,730	...	.....
20	1	45,950	0.29	.....	...	.....
	2	53,380	0.31	.....	...	.....

Conclusions regarding the influence of larger size test bars on the test results should not be drawn from these few experiments, but they are very interesting.

Further results were obtained on heats in which from 10 to 17 per cent. of the low carbon pig was used, the iron being cast into cylinders, turbines, cylinder covers, cylinder boxes, etc. Analyses and tests are given in Table 5, the latter being the average of five determinations.

In order to see the effect of larger amounts of the low carbon pig iron, test bars were cast from a heat containing 22½ per cent, 30 mm diameter and

turned to 20 mm diameter (0.787 in.). The results are given in Table 6.

Table 5.—Analyses and Test Results with 10 to 17 Per Cent. Low Carbon Iron.

Cast No.	Total carbon, per cent.	Silicon, per cent.	Manganese, per cent.	Phosphorus, per cent.	Sulphur, per cent.	Transverse strength, lb. per sq. in.	Tensile strength, lb. per sq. in.
1	2.20	1.10	0.57	0.60	.....	.....	37,880
2	3.35	1.40	0.53	0.68	.....	.....	31,200
3	3.45	1.17	0.55	0.53	.....	.....	35,200
4	3.00	1.12	0.45	0.40	.....	.....	36,700
5	3.10	1.10	0.47	0.50	.....	.....	33.800
6	3.50	1.00	0.35	0.20	.....	.....	36,720
7	3.30	1.00	0.68	0.35	.....	.....	35.410
8	.....	1.74	0.64	0.29	0.061	73,960	.....
9	.....	1.33	0.51	0.46	0.065	68,550	.....
10	.....	1.35	0.60	0.47	0.067	56,320	.....

Table 6—Results of Test Bars from Heat with 22.5 Per Cent. Low Carbon Iron.

Bar No.	Comb. carbon, per cent.	Graphite, per cent.	Silicon, per cent.	Manganese, per cent.	Phosphorus, per cent.	Sulphur, per cent.	Tensile strength, lb. per sq. in.	Elongation, per cent.
1	0.83	2.52	1.60	0.78	0.30	0.081	40,820	1.00
2	0.81	2.49	1.55	0.73	0.27	0.094	40,110	0.50
3	0.86	2.42	1.58	0.72	0.27	0.115	41,530	0.75
4	0.85	2.40	1.63	0.72	0.27	0.114	41,100	1.00

The test results obtained are high. Before the use of the low carbon pig iron the transverse strength obtained with round bars 30 mm (1.18 in.) diameter, with good castings, was 49,780 to 56,890 lb. per sq. in.; the deflection with bars placed on supports 600 mm (23.62 in.) apart 0.31 in. to 0.39 in.; and the tensile strength 24,180 to 28,450 lb. per sq. in. From the results given in Table 1 on square bars, and the change according to the ratio 1: 1.2, the average transverse strength on the round bars is raised to 67,930 lb. per sq. in. This latter result agrees very well with the average given in Table 3. The increase is from 19.4 to 36.4 per cent. The increase in tensile strength is 25.9 to 48.1 per cent. when 15 per cent. of the special iron is used and from 43.75 to 69.1 per cent., when 22½ per cent. is used.

The tests have shown, therefore, that through the use of low carbon iron in the charge a considerable improvement in properties is brought about. With 15 per cent. the value of the transverse and tensile strength is increased about one-fourth and with greater amounts there is a correspondingly greater increase. G. B. W.

A Rapid Enameling Process

An enameling process, the distinctive feature of which is a quick-drying secured by heating the objects treated in large ovens under a relative high percentage of humidity, has been perfected by the Fickling Enameling Corporation, Long Island City, New York. By this method, known as the Radio-enameling process, an automobile can be refinished in three days.

After the initial enamel has been applied by either dipping or spraying, the parts are placed in these specially constructed ovens and dried under a uniform temperature and humidity. Thermostatic control keeps the temperature between 110 and 120 deg. F., and water control on a diaphragm regulates the humidity at a point about 40 per cent. of saturation. Where the character of materials allows, the temperature is increased to as much as 200 deg. The final enamel is subjected to a similar baking at a slightly lower temperature.

Drying in the ovens under the constant relation of temperature and moisture and the use of water-washed air are said to secure more lasting enamel than is possible by ordinary air drying. Keeping the outer surface green permits the inner layers to dry and set, thus securing a hard and enduring foundation. When dried in the open air, the surface becomes hard, while the under coatings may be green for some time. On automobile hoods this results in sweating. W. I. Fickling, president of the corporation, is of the opinion that the Radio method will have wide industrial uses because of the time saved in drying. One oven 19 ft. 6 in. x 42 ft. is in use at present and Mr. Fickling holds that the method would be efficient with even a larger oven.

Changes in Lake Superior Iron-Ore Lists

The Hill iron ores are listed under three names in the 1915 ore book of M. A. Hanna & Co., Cleveland, Ohio, who recently took over the sale of these ores. One is the Leonard and the other two which are from groups of mines, are to be known as the Marcus and the Jerome. The Marcus ore is made up from the Smith, Leonard and Dunwoody group of mines. The Jerome ore is made up from the Harold, North Uno and Leonard group. All these are non-Bessemer ores. Interest will be taken in the analyses of the La Rue and Nashwauk ores, the former a Bessemer and the latter a non-Bessemer from the La Rue pit at Nashwauk, owing to the fact that a washing plant has been installed for these mines. The iron content of the La Rue ore in its natural condition is now 55.55 per cent. as compared with 52.07 per cent. before it was washed. When dried, the silica has been reduced from 11.62 to 7.70 per cent. and the alumina from 1.55 to 0.86 per cent. The moisture in the natural ore has been reduced from 9.29 to 8.33 per cent. The iron content of the Nashwauk by washing has been increased from 51.18 to 53.93 per cent. natural. When dried, the silica has been reduced from 11.08 to 9.40 per cent. and the alumina from 1.85 to 1.09 per cent. The moisture in the natural ore has been reduced from 10 to 7.81 per cent. The Clarion is a newly listed high manganese ore from the Mahoning pit in the Mesaba range. The name of the Stock Beaver, a Mesaba non-Bessemer ore, has been changed to the Mercer, so that it will not be confused with the Beaver, a non-Bessemer ore from the same range. In the Menominee range two new ores are listed —the Ernst No. 1, a high grade foundry ore, and the Ernst No. 2, a high manganese ore, these coming from the Ernst mines near Commonwealth. A newly listed non-Bessemer Menominee ore is the Bates. In this range the Harper, a non-Bessemer ore, is offered crushed this year, an ore crushing plant having been installed recently. The Republic Bessemer and non-Bessemer are omitted from the list for the Marquette range, the Republic mine having been taken over recently by the Cleveland-Cliffs Iron Company.

A number of new Lake Superior ores are listed in the 1915 analysis book issued by Pickands, Mather & Co., Cleveland, and several ores listed in the 1914 book are omitted. The new ores include the Isabella, Pewabic, South Chandler, and Toledo, old range Bessemer ores; Balkan, Snyder and Cedar, old range non-Bessemer ores, and the Mace, a Mesaba range Bessemer. The ores listed last year and omitted this year include the Gamma, an old range non-Bessemer; the Madrid, Morrow, Pearson and Spring, Mesaba range Bessemer ores; the Ajax, Morrow, Scranton, Virginia (non-Bessemer), Mesaba range non-Bessemer ores, and the Waucedah, a silicious ore.

Message of Wrought-Iron Bar

Using as a preface the familiar series of 16 arguments upon the merits of which a number of makers of iron bars jointly urged a consideration of the rightful place of wrought iron in the metal industries, the Interstate Iron & Steel Company, Chicago, has issued an instructive pamphlet descriptive of its plant and facilities for the manufacture of bar iron. The matter presented is also general in character, in that an outline is given of the processes by which the several kinds of wrought iron are brought to a finished state. The pamphlet is interestingly illustrated.

CO-OPERATION IN FOUNDRY*

High Standards of Living Encouraged—Selling and Producing Go Together

BY WM. H. BARR †

The iron foundries of this country, particularly those classed as jobbers, have not progressed in proportion with other branches of the metal trades. One may say that we have succeeded in spite of ourselves. We have not, except in a few cases, developed in our forces, a clear understanding or appreciation of that misused word "efficiency." In many cases the manager of the foundry is at fault. He has not afforded his foreman and employees an opportunity to promote themselves, for the simple reason that he has not promoted himself, by keeping abreast of improvement in foundry practice. That particular plant, therefore, has suffered from a lack of collective efficiency of employees regardless of how energetic or capable specific individuals may have been. Assuming the mistaken attitude of many manufacturers in all lines, this manager has attempted to develop his personal success rather than that of the organization which he leads. Today, however, many of those same men realize that teamwork is the only kind that secures results, and that the organization as a whole must have all possible development in each department. Managers are understanding too, that foremen and sales representatives form an important board of advisors, and it is for them to demonstrate that the business of the year may be profitable. Each department head, and I include the salesmen in this class for the reason that each man has specific territory to cover, should be taught to have an understanding, not only of their particular duties, but of the value of common fairness as applied to each other.

Foundry engineering is in a deserved ascendency, utilizing the skill of the inventor coupled with corresponding development in the personnel and esprit de corps of the force, and recognizing the value of the results to be gained by a well balanced policy of humanitarianism. Progress in the production of castings will be assisted by a careful analysis of the facilities offered for the health and comfort of the employees, and installation of reasonable conveniences beyond the necessary comforts should be effected, many of which may be made a source of income rather than expense. Regardless of factory laws, it is practical to install clean toilets, wash and locker rooms, thus furnishing the molder a place for the safe deposit of street clothes, and the opportunity, if he cares to avail himself of it, to freshen up before going home. These suggestions, if carried out, will help to dignify the trade of molding and place it on a higher comparative plane, the direct benefits of which are obvious.

A WORKS STORE FOR IMPROVING SHOP CONDITIONS

Again, the foundry or works store is something which I enthusiastically endorse as being keenly appreciated by all employees. It has been found advisable to have for sale cigars and tobacco which, if properly bought, are sold to employees at about 20 per cent. less than prices asked by the corner saloon. Cigarettes are barred. Chocolates, candies and chewing gum also find ready sale at similar prices and the consumption per man will frequently average from 5 to 7 cents per day. The direct result is beneficial to the men, in that candy supplies, in the best manner, some of the alcohol which the system requires, plus the excellent nourishing value of the chocolate. In plants where chocolates or chewing gum are available, drinking to excess has been checked, the men are healthier, the percentage of accidents has been decreased, the Monday morning grouch is minimized and a lower percentage of loss in bad castings has been maintained. Also, the sale of bottled milk of good quality at moderate prices has proved very popular and healthful and has still further reduced liquor consumption. Cakes, coffee, and even supplies such as foundry shoes, leggings, goggles, etc., are sold for the convenience and economy of employees. Further, a proper understanding and adoption of safety devices, even to very minor details, convinces the molder that you have his interest at heart, and he responds in like proportion by harmonious efforts, rather than by antagonistic criticism, and a further increase in production is thereby effected.

Right here I must emphasize the direct financial gain resulting to both molder and founder by a business like elimination of the extreme disorder which so frequently prevails in foundries, and especially in the jobbing shop. It is not an extravagance to state that an increased output of 10 to 12 per cent. can be attained if flasks and appliances of all sorts are available in an orderly fashion. Every time a molder starts on a still hunt for a proper clamp, chain or gagger, perhaps hurdling one or two piles of old sand or bottom boards en route, so much skilled effort has been lost. Very naturally too, the molder who works in an untidy plant is apt to be careless about his work. Conversely the molder who works in a neat, orderly plant, where passage ways are free, and his needs quickly supplied, always produces a higher order of work, more of it, and is much more anxious to remain permanently in his position. One capable laborer will keep a foundry in order and the effect on production is magical.

CREATING HIGHER PERSONAL STANDARDS

It is well to consider methods best suited for increasing the earning capacity of our molders. Why should we object to paying the very highest wages to a skilled mechanic if he in turn is giving a corresponding increase of output and to that extent reducing the percentage of overhead chargeable to his floor? If the molder is supported in his laudable desire to give increased comforts to his family, he is a better asset to his employer in his attitude toward shop discipline, as well as in his earning capacity. Why, then, should be not assist him by providing proper ventilation, air vibrators, air riddles, blow-offs and minor modern conveniences? It is most important to have patterns and coreboxes systematically cared for and repaired by a man whose sole duty it is, and who can also correctly put in the hands of the molder all the matches and equipment that go with the pattern and job, again, economizing the time of the direct producer.

One failing of the average foreman is the lack of interest in the development of intelligent lads into skilled mechanics. While the molding machines and their operators are of undoubted value, we must see to it that we educate men to enlarge our force, otherwise, we shall have no solution of the problem of securing capable molders, either in time of labor strife or of unusual prosperity. Further, it is true that apprentices trained under careful foremen or efficient instructors will

*From an address before the Pittsburgh Foundrymen's Association.

†General manager of the Lumen Bearing Company, Buffalo, N. Y., and president of the National Founders' Association.

be less apt to yield to the shackles of unionism. They realize that they are an independent body, worth more to their employers and themselves if they do not absorb the dangerous fallacy, that the less they produce the more they will have to divide.

In approaching the subject of team work with the marketing force, emphasis should be laid on the following points: When developing the sales department, care should be exercised in choosing the type of man necessary to succeed in the foundry business. Many managers are apt to put out inexperienced foundry men, though possessing possible sales merit, because, from a salary viewpoint, they seem to be economical. If force of circumstances compels the engagement of such a man, care should be taken to give him a general course of instructions, which will at least cover the rough details of the business before he is assigned to a territory. His personality should do the rest. It is admittedly preferable to send out as sales representatives men who have had a foundry training, and this could more frequently be done if managers would encourage foundry employees who show natural sales ability to become eventually members of the sales force. Any man having the proper qualifications would work unceasingly to adapt himself to this changed and conditional opportunity, and his training would enable him to advise his customer in a practical way.

CO-OPERATION BETWEEN PRODUCTION AND SALES

The salesman should be an optimist filled with enthusiasm about his goods, and the standing of his company, and with the determination to see that the foundry properly carries out those details which he has promised to his customers. The management must be in position to offer to the salesman exact knowledge of actual costs, in order to put him in the best position for meeting competitors. Too frequently it is true that in jobbing shops a cost is arrived at from average tonnage, regardless of the fact that large castings may cost less than 2c. to produce, and without realizing that small castings worth anywhere from 5c. to 10c. per lb. are cutting down the earnings of more desirable grades of castings, and leaving the founder without the knowledge of true values necessary for the guidance of a successful sales force. Again, quality is too frequently considered to be a minor matter in comparison with the tonnage, and many castings are allowed to go from the shipping departments which should be scrapped rather than that the customer be put to the expense and inconvenience of returning them. Where careless deliveries of this kind are permitted the salesman is once again at an extreme disadvantage, and an opportunity is given the purchaser to make justifiable complaints, which he will use as a leverage in attempting to secure lower prices.

Generally speaking, 50 per cent. of foundry foremen are antagonistic to the sales force, and are averse to making suggestions or giving information to the more or less experienced salesmen. I believe this attitude is absolutely wrong. If managers are as progressive as they should be in the ideal foundry, which I am attempting to describe, salesmen will be permitted to spend necessary time in the foundry in conference with department heads, acquiring knowledge which may be of immense value. Foremen should not forget that salesmanship is in itself a profession and, that if willing support and cordial co-operation is given to the salesmen, the common good of all will be directly conserved. It is the foreman's duty to point out to the sales force the bad points in jobs upon which they are estimating, urge specific recommendations for the construction of patterns, and in general equip representatives as completely as possible for the successful handling of the projects upon which depend a certain amount of the prosperity of the company. In addition, the salesmen should have the information necessary to supply full data as to the requirements of customers, to try and arrange deliveries for the convenience of his foundry, to keep in touch with the improvements developed by competitors, and in every way suggest to the production department anything that will help them create sound economies and improve their output. I thoroughly believe in the enthusiastic support of the sales and production heads, which is fostered by the management of many of our leading industries. Frequent meetings where everything in relation to the plant is discussed, from manufacturing to advertising and financing, gives an employee a sense of partnership which is invaluable, particularly when it is necessary for him to defend his firm's dealings with his customers where dissatisfaction has arisen and his company's methods must be justified.

Salesmen should also have complete daily information of everything which pertains to their particular districts or territories. Copies of orders, invoices, inquiries and correspondence should be daily referred to them, and the production department should be in a position to offer comprehensive information as to its final costs as compared with original estimates, for their guidance in future sales. Without this complete support a salesman frequently falls a victim of the capable purchasing agent through lack of the knowledge which should have been supplied him.

Dates of Coming Conventions

Among the conventions of special interest to the iron and steel and metal-working trades which are to be held in April, May, June and September are the following:

April 12-15—National Metal Trades Association, Hotel Astor, New York.

April 14-16—Southern Supply and Machinery Dealers' Association, Atlanta, Ga.

May 18-19—National Association of Manufacturers, Waldorf-Astoria, New York.

May 20-21—National Machine Tool Builders' Association, Atlantic City, N. J.

May 25-28—American Iron, Steel and Heavy Hardware Association, St. Francis Hotel, San Francisco, Cal.

May 25-28—Master Boiler Makers' Association, Hotel Sherman, Chicago, Ill.

June 3- 5—American Supply and Machinery Manufacturers' Association and National Supply and Machinery Dealers' Association, Hotel Bellevue-Stratford, Philadelphia, Pa. (Joint convention.)

June 9-11—American Railway Master Mechanics' Association, Atlantic City, N. J.

June 9-16—Railway Supply Manufacturers' Association. Convention and exhibit in conjunction with the Railway Master Mechanics and the Master Car Builders.

June 14-16—Master Car Builders' Association, Atlantic City, N. J.

June 22-25—American Society of Mechanical Engineers, Buffalo, N. Y. (Spring meeting.)

June 22-26—American Society for Testing Materials, Hotel Traymore, Atlantic City, N. J.

Sept. 27-30—American Foundrymen's Association, the Foundry and Machine Exhibition Company and the American Institute of Metals, Atlantic City, N. J.

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The Closed Shop a Monopoly

An important decision has been rendered by the Supreme Court of Connecticut in a labor case. In effect it declares that under the common law an illegal monopoly is accomplished when trade unions establish closed shop conditions in a community, so that a non-union workman is barred from employment. The case originated at Danbury, Conn., and while related to the famous Loewe case it has no connection with it. A hatter named Connors, who was a member of the Hatters' Union until the time of the Loewe case in 1909, was expelled with several other members who opposed restrictions of individual rights by the union. The expulsion, it appears, was not made a matter of contest before the court, as it was regarded as being the right of the union. After the expulsion, however, Mr. Connors could get no employment. Practically all the shops in Danbury were either closed or were controlled by the union. He was finally driven from the city and then brought suit against the officers of the union for damages for conspiracy and restraint of trade. The case was carried to the Supreme Court of the State which last week rendered its decision, awarding $1100 damages. In giving its decision the court stated that monopolies "are especially intolerable where they concern the basic resources of individual existence, to wit, the capacity to labor." It further stated that the "interest of the public outweighs that of the individual, and the public at large can see nothing but danger in the monopoly of anything of which there is a common need or which is a common resource of life."

This case is taken as establishing by high judicial authority the point that there is a tyranny of labor against which a man can be supported by the courts if he decides to resist it. This sort of tryanny is regarded as even more obnoxious than the tyranny of capital because, as the New York Times says, "it is exercised against those less able to defend themselves." It is now a settled law that the monopoly of labor is an offense against labor because it is an offense against the community of which the working class is a large part and an essential interest regardless of numbers. It is interesting to note that one of the union officials against whom this suit was brought is a man who has since risen to high official position, being Labor Commissioner Connolly of Connecticut. His elevation to that position was doubtless due to his prominence in trade-union affairs. The result of this suit against him shows how unfit he and others of his kind are to be intrusted with the duties of an office that should require impartial consideration of the rights of all workingmen, as well as employers.

Steel Exports and the War

So much has been made in the daily press of the "war orders" placed with metal-working companies in this country, and of inquiries on which many companies bid, whereas only one finally gets the order, that the amount of the business is quite surely put too high in common estimates. There are authentic statistics that permit of checking it up in some products. For example, wire exports are carefully reported in the Department of Commerce publications month by month. From what was published week by week in the first few months of the war it might easily have been judged that several hundred thousand tons of barb wire was going across the Atlantic for prompt use by the belligerents. Yet for the six months ending with January the total exports of barb wire were but 60,260 tons. For the corresponding six months in 1913-14, with no war and no European demand for barb wire for defense, the total was 43,330 tons.

In those iron and steel products reported by weight, the war has by no means swelled the total to the extent commonly supposed. Bars for shrapnel and barb wire are the chief war materials on the list, but full allowance should be made for export business in other lines which comes to the United States because Europe cannot export steel. Even so, the comparison does not bear out the view that the war is compensating American steel companies for what is being withheld by the railroads or is being cut off by lack of confidence of several kinds. In the last three months for which there are official statistics—November, December and January—the exports of the iron and steel products reported in tons were 397,359 tons, or an average of 132,453 tons, which would represent 1,589,000 tons a year. In the entire year 1914 the total was 1,540,574 tons, or nearly as much, while for 1913 it was 2,730,483 tons and for 1912, the banner year in iron and steel exports, 2,947,596 tons. Thus it appears that up to the close of January the outward iron and steel movement in war months was at a rate not more than 50 per cent. of that for the peaceful year 1912.

It is true that machinery exports are not included in the above figures; but they are stated in values and comparison can be readily made. Else-

where are given advance details of these exports for the eight months ending with February. The total was $52,900,000 or nearly $25,000,000 less than that for the eight months ending with February, 1914. Metal-working machinery was the only important class showing an increase, the eight months totals being $13,500,000 and $9,300,000 to the end of February, 1915 and 1914, respectively. Here is a $4,000,000 gain; but it will scarcely be claimed that that amount spells any such prosperity for the machine tool industry as has stirred the imagination of some of the heralds of American good times as a by-product of European war.

It is to be said that none of the figures above given include heavy guns or rifles or shrapnel or shrapnel cases; nor do they account for motor trucks, of which $10,989,000 worth were shipped abroad in the seven months ending with January, against but $714,000 worth in the corresponding months in the preceding fiscal year. It is also well known that with better shipping facilities all iron and steel exports have increased. They may have risen to 200,000 tons a month in February and March and now may be at a higher rate for products reported by weight. But all the means of measurement available show that the iron and machinery trades have been credited with a much nearer approach to normal operations due to the war than the war has actually conferred upon them.

Good-Will Judicially Defined

The Supreme Court of the State of Washington has given a much broader interpretation of good-will than has heretofore been promulgated. The Northern Pacific Railroad Company had appealed to the court for a reduction in its assessment valuation for 1913, which was declared by the railroad's attorneys to be largely in excess of the value of the company's property. In rendering its decision, the court states that there are intangible elements of value not included in usual items of physical valuation. Some of the intangible elements it cited are as follows: Density of traffic; value of business handled; nature of country traveled; facilities for transacting business; points and convenience of fuel supplies; resources of country contributary.

The court, in making this remarkable decision, has overlooked some other "intangible elements" making a railroad property of value. It is a common expression that a capable manager is a valuable "asset" of any commercial enterprise and the court, therefore, might have gone on to enumerate such elements as a sagacious president, a competent directory board, a shrewd finance committee, a wide-awake purchasing agent, an expert traffic manager, a judicious general superintendent and a contented and efficient corps of employees, the united efforts of whom make tracks and rolling stock and terminals valuable. A correct appraisement of this set of elements contributing to a railroad company's success would undoubtedly make its taxable value still higher and its annual payments to the State treasury far greater. Other elements might be cited in this connection, but these are sufficient to show what a splendid field could be exploited for enhancing railroad values for taxation.

The peculiar views expressed by the court may be applied in a far different direction. Under this decision we may be permitted to believe that in a State whose highest court holds such a doctrine of "intangible elements of value," the contention of labor leaders that employers have no property right in the conduct of their business would fall to the ground. The State of Washington may have blazed an entirely new path for business interests in this decision.

Commerce Commission Statistics

Three months earlier than last year the Interstate Commerce Commission issues its preliminary abstract of steam railroad statistics for the fiscal year. As a rule, it may be considered a misfortune that the railroad fiscal year ends June 30, since the steel trade is committed to the calendar year and thinks in terms of the calendar year, so that it is difficult for it to make a mental tabulation of what a fiscal year report on the railroads really means. Thus the rail production statistics, recently published, showed 3,502,780 tons in the calendar year 1913 and 1,945,095 tons in 1914, a decrease of 44.5 per cent., while the present steam railroad statistics refer to one-half of the one year and one-half of the other. A year hence, however, the commission's report will throw an interesting light upon how the European war affected American railroads. It may be mentioned that of late there has been considerable agitation in railroad circles in favor of adopting the calendar year, and indeed several important systems, like the Pennsylvania, have always used the calendar year. It would seem desirable for the commission to use its influence in favor of such a change.

From June 30, 1913, to June 30, 1914, there was an increase in the steam railroad mileage (roads with $100,000 annual revenue or more, exclusive of switching and terminal companies) from 244,418 to 247,398 miles, or 2980 miles. Locomotives increased from 63,378 to 64,760, or 1382. Per thousand miles of line the locomotives increased from 259 to 262, indicating a very small provision for the increasing density of traffic that should naturally attend railroad operations.

The number of cars in freight service increased from 2,273,289 to 2,325,647, or 52,358; the number of cars per thousand miles of road increased from 10,005 to 10,121, or 1.21 per cent. The increase, while small, is definite and should set at rest the statements now and then made in the last fiscal year that the railroads as a whole were not replacing their vacant numbers. Whether they are doing as much as this in the current fiscal year, however, is another matter entirely.

It is significant that the average capacity of all the freight cars increased in the fiscal year from 38.2 net tons to 39.2 net tons, or 2.6 per cent., this indicating in itself that there was considerable replacement of old and small cars by new and larger cars, for the small increase in the total number of cars would not account for such a percentage increase. The increase in total capacity of freight cars was 4.40 per cent., and allowing for the increase in mileage, the freight car capacity per thousand miles of line increased 3.35 per cent. It

is very doubtful whether there was a corresponding increase in the loading of the cars that were moved, while it has lately become quite well known that the average loading, making exception of the coal, coke and ore traffic, is only about one-half capacity.

One of the most accurate indices of the state of trade is the freight ton mileage. This has been as follows, in fiscal years:

1905	186,463,109,510	1910	255,016,910,451
1906	215,877,551,241	1911	253,783,701,839
1907	236,601,390,103	1912	264,080,745,058
1908	218,381,554,802	1913	301,398,752,108
1909	218,802,986,929	1914	288,319,890,210

It will be seen that even with the backset in 1914 as compared with 1913 the railroads did a much larger business than that of only a few years ago. It is this rapid and almost constant increase in traffic that has enabled the railroads to bear the burden of decreasing rates and increasing expenses as well as they have and their chief hope for the future lies in a continued increase, not, of course, in merely the total movement, but in the movement per mile of road. Comparing the figures over a long period of time, the total freight ton-mileage of the steam roads has doubled every 12 years, and such a doubling occurred from 1901 to 1913, or in 12 years. If this increase continues, with the much smaller increases that now occur in the total railroad mileage, it should exert a favorable influence upon railroad earnings.

The greatest increases in the railroad mileage of the United States occurred in the decade of the eighteen-eighties, the year 1887 holding the record of all years in this respect, while since then the annual increases in mileage have been decreasing more or less steadily. It must not be inferred from this that the work of railroad building is largely completed. Perhaps it would be fully as accurate to say that the work, if it is to be prosecuted properly, has only been begun, that only the foundation has been laid. A single track road is not much of an operation and except under special conditions is not to be regarded as normal equipment. We find, however, that on June 30, 1914, with a total of 247,398 miles of steam railroad reported, there was only 27,604 miles of second track and 2696 miles of third track, so that 88.9 per cent. of the total railroad mileage was single track. Certainly an increase of traffic making feasible the double tracking of these roads would result in very much more satisfactory earnings per dollar of total investment.

Italian Steel Industry Short of Scrap

Italian steel works are having trouble securing an adequate supply of scrap. Usually from 300,000 to 400,000 tons has been imported annually. The available domestic supply is about 500,000 tons yearly, according to the London Iron and Coal Trades Review. Imports since the war started have been only one-third to one-fourth of normal, Germany not allowing any to go to Italy. Scrap prices have advanced from $12.16 and $15.56 to $21.41 and $25.30, and ferromanganese and other alloys have risen sharply, being obtainable from abroad with great difficulty. Some plants have been obliged to shut down or restrict output because of scarcity of scrap, and steel makers have asked the Government to place at their disposal all of the scrap controlled by the railroads and the army and navy, and to negotiate with other countries for scrap in return for the grant of export facilities for Italian products.

CORRESPONDENCE

Education to Foster Protection

To the Editor: Can we have a protective tariff without educating the rural population? This question appeals to every person engaged in the manufacture of articles on which the recent tariff reduction has crippled business. When the self-inspired politician is making a race for Congress, or the Senate, he often emphasizes the statement that the United States can compete with any nation on the globe when it comes to producing manufactured necessities used on the farm and that the country should have free trade so that the farmers can buy what they need at a considerable saving. These assertions have taken a firm hold on the minds of those unacquainted with trade and commercial requirements and have caused agricultural producers to overlook the most important factor of the case. As a matter of fact, the selling of farm products for high prices is of far greater importance to the farmer than to be able to buy needed manufactured articles at the small discount free trade would effect. In order for the rural population to receive satisfactory prices for what they raise the consuming population of our cities, composed largely of laborers, must necessarily receive high wages to be able to pay the prices demanded.

The manufacturer who has no plant outside of the United States is confronted with many difficulties with which the greater number of our law-makers and voters are not acquainted. He must walk within the narrow confines of our laws, must pay high salaries to his employees and compete with the foreign concern employing equally efficient labor for much less. If we had an international labor law whereby the people of every nation would receive the same wages for their respective work, the theory of free trade would be more practical, but when it is remembered that the cost of labor in this country exceeds the cost of material in many articles of manufacture, the need of a protective tariff is obvious.

L. W. Wainwright's letter in *The Iron Age* of December 17, 1914, says: "It has been said that under the high tariff the public pays the duty. Granted that this is true, it is a fact that under the reduction of the tariff on our product the public pays the high duty just the same." This is a point that every person familiar with trade conditions should constantly emphasize.

There seems to be only one remedy for the present existing unsatisfactory trade condition, and that is to start a national campaign of education so that the rural voters, together with the laboring class of the cities, will come to realize the real need of this country, and not support Congressmen and Senators who are working for a lower tariff or free trade. Then, and not till then, will the United States rise to the pinnacle of commercial success or supremacy.

SAMUEL H. KENNEDY, M. E.

Tunnel Hill, Ga.

E. Webb, blast furnace superintendent, and F. D. Egan, electrical, steam and hydraulic engineer, of the Pittsburgh Crucible Steel Company, Midland, Pa., have completed and are operating a new larry charging scale car. This car has many new features. One is a very simple arrangement for operating the ore-bin gates. It is ultimately to be operated by one man.

The Pratt & Whitney Company of Michigan, on or before May 1, will vacate its offices in the Majestic Building and store at 52 Larned street, Detroit. New quarters for both the offices and store have been obtained in the Kerr Building, Beaubien and East Fourth streets, Detroit, where a complete stock of Pratt & Whitney small tools will be carried.

The City Council, Ottawa, Ont., is in the market for equipment and machinery for a municipal repair shop. John Graham is superintendent.

Metal Trades Convention Programme

The Bulletin of the National Metal Trades Association issued from the office of Commissioner John D. Hibbard, Chicago, Ill., announces the programme of the seventeenth annual convention of the association at the Hotel Astor, New York, April 12 to April 15, as follows:

PRELIMINARY MEETINGS

Executive Committee meeting, Monday, April 12, 3 p.m.
Secretaries' breakfast, Tuesday, 8 a.m.
Administrative Council meeting, Tuesday, 10 a.m.
Joint luncheon, local presidents, secretaries and Administrative Council, Tuesday, 12.30 p.m.
Alumni dinner, Tuesday, 6.45 p.m.

Convention Programme

MORNING SESSION, WEDNESDAY, 9.30

Address of welcome by H. N. Covell, president New York and New Jersey Branch.
Roll call, reading of minutes, appointment of convention committees.
Reports of officers: Herbert H. Rice, president; F. C. Caldwell, treasurer; John D. Hibbard, commissioner, and H. D. Sayre, secretary.
Reports of standing committees: Industrial Education, F. A. Geier, chairman; Apprenticeship, W. A. Viall, chairman; Membership, John W. O'Leary, chairman; Publicity, Justus H. Schwacke, chairman.
Following the morning session a buffet luncheon will be served to the members and guests.

AFTERNOON SESSION, 2 O'CLOCK

Report of Committee on Prevention of Industrial Accidents, W. H. Van Dervoort, chairman.
Address, "Co-operative Work of National Employers' Association through Conference Boards," by Magnus W. Alexander, General Electric Company, West Lynn, Mass.
Address, "The Highways and Hedges of Many Managers of Men," Walt S. Goodwin, Young Men's Christian Association, New York.
Convention banquet, 7 p. m. The speakers on this occasion will be Frederick P. Fish, of Boston, and Alfred W. Martin, of New York.

FINAL SESSION, THURSDAY, 9.30 A. M.

Address by Walter Drew, commissioner National Erectors' Association, New York.
Address by Daniel Davenport, general counsel American Anti-Boycott Association, New York.
Reports of convention committees.
Report of Nominating Committee, F. C. Caldwell, chairman.
Election of officers.
Installation of officers.

The American Society Boiler Code in Ohio

Much gratification is felt among those who worked so diligently to secure a standard code of boiler rules at the following notice to manufacturers of steam boilers and general and special inspectors issued by the Ohio Board of Boiler Rules, March 29:

Until further notice, an inspector holding a certificate of competency and a commission authorizing him to inspect steam or hot water boilers which are to be installed within the State of Ohio is hereby authorized to inspect during construction and on completion stamp "OHIO STD," with serial number, any boiler constructed in accordance with rules formulated by the Boiler Code Committee as submitted to the Council of the American Society of Mechanical Engineers, February 13, 1915.

In view of the fact that the old Ohio rules had proved very satisfactory, it is believed that this action has been taken by the Ohio Board of Boiler Rules for the purpose of assisting in securing the adoption of the American Society code throughout the country and thus accomplishing the desires of those interested.

Wisconsin metal tradesmen, in conjunction with other large employers, appeared before the Wisconsin Legislature to protest against the passage of a proposed amendment to the workmen's compensation or industrial insurance act, which provides for an average increase of 25 per cent. in the rates of compensation fixed by the present law for disability.

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Boiler Manufacturers Adopt A. S. M. E. Specification

At a joint meeting of the American Boiler Manufacturers' and the National Tubular Boiler associations, held at the Fort Pitt Hotel, Pittsburgh, Pa., March 29, the boiler code of the American Society of Mechanical Engineers was adopted. This action places practically the entire boiler manufacturing industry back of the code and marks the climax of a continuous effort for 25 years to get a standard specification that would be acceptable to engineers, the insurance companies and boiler users and manufacturers. A number of manufacturers present at the meeting announced that in the future all of their boilers would be made to conform to these specifications, regardless of whether they were required to do so by State legislation or not, and a representative of one of the large boiler inspection companies stated that hereafter its specifications would be drawn to conform to those of the American Society of Mechanical Engineers. The Committee on Uniform Standard Specifications, which presented the report resulting in the adoption of the code through its chairman, Thomas E. Durban, general manager, Erie City Iron Works, Erie, Pa., was continued and instructed to carry on its work, including the interesting of legislatures in it, until another joint meeting of the two organizations could be held.

PIG-IRON OUTPUT GROWS

Further Gain of 15 Furnaces in March

More Merchant Stacks Go in, but Steel Works Furnish Most of the Increase

Pig-iron production in March shows another notable increase, the total for the 31 days being 2,063,834 gross tons, or 66,575 tons a day, against 1,674,771 tons in the 28 days of February, or 59,813 tons a day. The steel companies furnished most of the 6700 tons a day increase, but the merchant furnaces after a year of steadily declining and more recently stationary output, produced 900 tons a day more in March than in February. A number of furnaces blew in late in March or on April 1, making a total of 191 active on April 1, with a capacity of 70,591 tons a day, against 176 furnaces with a capacity of 63,033 tons a day on March 1. The large increase in the capacity rating for April 1 is due to the fact that many furnaces were driven harder in March than in February. The Pittsburgh district alone, with one furnace less in blast last month than in February, produced at the rate of 2000 tons a day more in March.

DAILY RATE OF PRODUCTION

The daily rate of production of coke and anthracite pig iron by months, from March, 1914, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

	Steel works	Merchant	Total
March, 1914	54,990	20,748	75,738
April	54,508	21,157	75,665
May	47,028	20,478	67,506
June	44,321	19,595	63,916
July	45,027	18,123	63,150
August	46,937	17,426	64,363
September	46,344	16,409	62,753
October	41,026	16,335	57,361
November	35,305	15,306	50,611
December	33,381	15,515	48,896
January, 1915	35,998	15,661	51,659
February	44,192	15,621	59,813
March	50,036	16,539	66,575

OUTPUT BY DISTRICTS

The accompanying table gives the production of all coke and anthracite furnaces in March and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Dec. (31 days)	Jan. (31 days)	Feb. (28 days)	Mar. (31 days)
New York	126,271	121,292	113,509	138,539
New Jersey	6,973	6,564	6,096	6,738
Lehigh Valley	65,388	62,205	52,384	61,116
Schuylkill Valley	44,786	40,691	39,756	50,814
Lower Susquehanna and Lebanon Valley	30,836	32,535	31,901	34,267
Pittsburgh district	349,401	370,745	429,771	527,541
Shenango Valley	54,289	66,184	80,922	95,229
Western Pennsylvania	116,295	122,713	116,524	129,657
Maryland, Virginia and Kentucky	34,201	33,481	27,828	40,680
Wheeling district	52,194	54,563	60,692	82,249
Mahoning Valley	148,057	171,624	182,912	247,530
Central and Northern Ohio	117,473	119,349	134,640	159,566
Hocking Valley and Hanging Rock	20,785	24,317	25,822	27,511
Chicago district	139,289	155,038	174,346	236,274
Mich., Minn., Mo., Wis. and Col.	49,944	60,218	60,787	66,921
Alabama	141,948	144,985	126,289	136,820
Tennessee	17,622	14,917	10,592	12,382
Total	1,515,752	1,601,421	1,674,771	2,063,834

PRODUCTION OF STEEL COMPANIES

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in the figures below, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production			Spiegeleisen and ferromanganese		
	1913	1914	1915	1913	1914	1915
Jan.	1,981,560	1,261,430	1,115,944	15,633	17,325	18,041
Feb.	1,792,154	1,329,414	1,237,380	20,131	10,524	13,319
Mar.	1,904,878	1,704,688	1,551,082	20,546	20,133	12,274
Apr.	1,939,751	1,635,226	.....	23,108	18,676	.....
May	1,991,192	1,457,847	.....	19,042	21,504	.....
June	1,860,070	1,329,623	.....	19,212	16,254	.....
July	1,840,216	1,395,851	.....	22,310	16,524	.....
Aug.	1,833,352	1,455,054	.....	20,680	11,577	.....
Sept.	1,828,232	1,396,322	.....	24,555	13,786	.....
Oct.	1,848,634	1,271,820	.....	19,499	17,435	.....
Nov.	1,573,007	1,059,159	.....	26,765	21,977	.....
Dec.	1,298,262	1,034,802	.....	14,095	20,733	.....

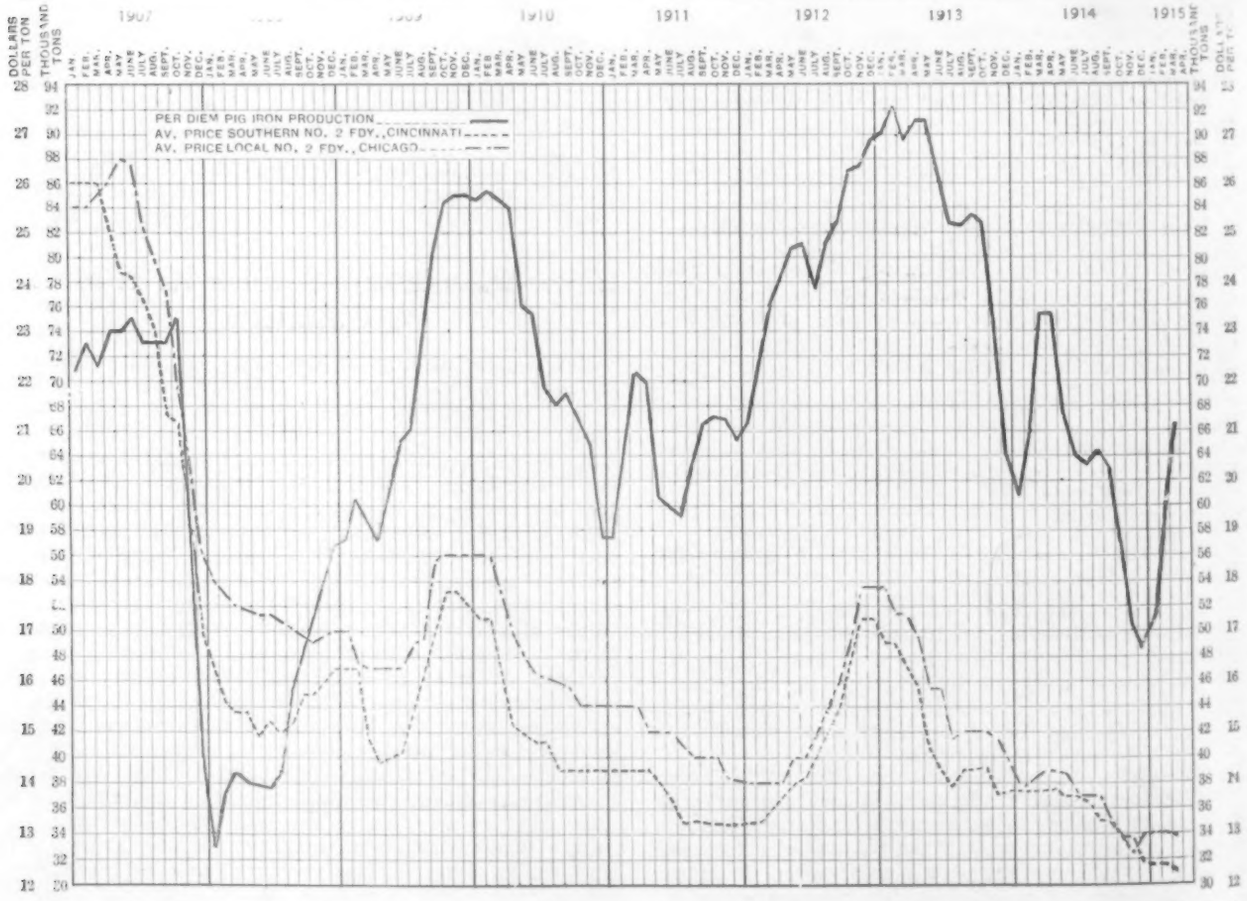

Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to April 1, 1915; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

CAPACITY IN BLAST APRIL 1 AND MARCH 1

The following table shows the daily capacity in gross tons of furnaces in blast April 1 and March 1, by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Apr. 1 Number in blast	Apr. 1 Capacity per day	Mar. 1 Number in blast	Mar. 1 Capacity per day
New York:					
Buffalo	19	12	4,874	11	3,708
Other New York	7	2	450	2	431
New Jersey	7	1	217	1	218
Pennsylvania:					
Lehigh Valley	22	8	1,840	7	1,687
Spiegel	2	2	199	2	184
Schuylkill Val.	16	5	1,704	4	1,420
Lower Susquehanna	7	2	502	2	520
Lebanon Valley	10	3	603	3	619
Pittsburgh Dist.	52	35	17,530	36	16,714
Ferro	4	1	102	1	120
Shenango Val.	19	8	3,140	7	2,890
Western Pa.	26	15	4,532	12	4,078
Ferro	1	0	0	1	85
Maryland	3	1	439	1	297
Ferro	1	1	95	1	113
Wheeling Dist.	11	7	2,815	6	2,168
Ohio:					
Mahoning Val.	25	21	9,089	16	7,125
Central and Northern	24	13	5,470	12	4,809
Hocking Val. & Hang'g Rock.	15	6	887	6	922
Illinois and Ind.	34	17	8,060	14	7,082
Ferro	2	0	0	1	75
Michigan, Wis. & Minn.	10	5	1,458	5	1,404
Colo. and Mo.	7	2	787	2	767
The South:					
Virginia	24	4	550	4	550
Kentucky	5	1	228	1	241
Alabama	46	15	4,557	14	4,321
Tennessee	20	4	463	4	485
Total	423	191	70,591	176	63,033

Among the furnaces blown in last month or on April 1 were one Lackawanna in the Buffalo district, one Hokendauqua in the Lehigh Valley, one Swede in the Schuylkill Valley, one Clairton and Soho in the Pittsburgh district, one Farrell and Atlantic in the Shenango Valley, Earlston and Perry in western Pennsylvania, one Mingo in the Wheeling district, Anna, Tod, one Ohio, Mattie and one Youngstown Sheet & Tube in the Mahoning Valley, one River in northern Ohio, one South Chicago and one Gary in the Chicago district, Tuscaloosa in Alabama and La Follette in Tennessee.

The furnaces blown out in March include one Donora, one Clairton and one Eliza in the Pittsburgh district, one Farrell in the Shenango Valley and Rockdale in Tennessee.

DIAGRAM OF PIG-IRON PRODUCTION AND PRICES

The fluctuations in pig-iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The figures for daily average production, beginning January, 1908, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1908—Gross Tons

	1908	1909	1910	1911	1912	1913	1914	1915
Jan.	33,918	57,975	84,148	56,752	66,384	90,172	60,808	51,659
Feb.	37,163	60,976	85,616	64,090	72,442	92,369	67,453	59,813
Mar.	39,619	59,232	84,459	70,036	77,591	89,147	75,738	66,575
Apr.	38,289	57,962	82,792	68,836	79,181	91,759	75,665	.....
May	37,603	60,753	77,102	61,079	81,051	91,039	67,506	.....
June	36,444	64,656	75,516	59,585	81,358	87,619	63,916	.....
July	39,287	67,793	69,305	57,841	77,738	82,601	63,150	.....
Aug.	42,851	72,546	67,963	62,150	81,046	82,057	64,363	.....
Sept.	47,300	79,507	68,476	65,903	82,128	83,531	62,753	.....
Oct.	50,554	83,856	67,520	67,811	86,722	82,133	57,361	.....
Nov.	51,595	84,917	63,659	66,648	87,697	74,453	50,611	.....
Dec.	56,158	85,022	57,349	65,912	89,766	63,987	48,896	.....

THE RECORD OF PRODUCTION

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1911—Gross Tons

	1911	1912	1913	1914	1915
Jan.	1,759,326	2,657,911	2,795,331	1,885,054	1,601,421
Feb.	1,794,509	2,100,815	2,586,337	1,888,670	1,674,771
Mar.	2,171,111	2,405,318	2,763,563	2,347,867	2,063,834
Apr.	2,064,086	2,375,436	2,752,761	2,269,955	.....
May	1,893,456	2,512,582	2,822,217	2,092,686	.....
June	1,787,566	2,440,745	2,628,565	1,917,783	.....
July	1,793,068	2,410,889	2,560,646	1,957,645	.....
Aug.	1,926,637	2,512,431	2,545,763	1,995,261	.....
Sept.	1,997,102	2,463,839	2,505,927	1,882,577	.....
Oct.	2,102,147	2,689,933	2,546,261	1,778,186	.....
Nov.	1,999,433	2,630,854	2,233,123	1,518,316	.....
Dec.	2,043,270	2,782,737	1,983,607	1,515,752	.....

Working a Virginia Manganese Mine

The Crimora Manganese Corporation, 15 Broad street, New York, which for a considerable time has been mining about 15 tons per day of high-grade manganese ore from its mines at Crimora, Va., announces that steps have been taken to increase the output to 50 tons per day and later to 200 tons per day. The facilities for mining 50 tons per day are expected to be in working order in about four months. The company states that it has a basin of about 90 acres which contains 1,000,000 tons of ore ranging in manganese content from 45 per cent. upward, with some other deposits of lower grade ores on its 1000-acre property. There is a considerable amount of pyrolusite, a crystallized oxide of manganese, containing 85 to 90 per cent. of oxide of manganese and less than 1 per cent. of iron. The company picks a considerable amount of this from the main ore, which it sells to dry-battery manufacturers and others. Investigations show that about 30,000 tons per year of such ore is consumed in this country.

The manganese ores are found imbedded in a large deposit of clay covered with 5 to 25 ft. of a super-soil. They average 5 per cent. of the clay near the surface and 15 to 18 per cent. lower in the basin. To secure the ore it is necessary to crush and wash the original deposits to remove the clay. For this purpose the company has arranged to increase its water rights and reservoirs. At present 8½ acres of the main basin of 90 acres has been opened up. The average ore produced contains 45 to 50 per cent. manganese. It is stated that in the eighteen-nineties the Carnegie Steel Company mined a large amount of ore from this property, but abandoned it owing to the cost of its method of mining, which was different from that now employed.

Blast Furnace Notes

No. 2 blast furnace of the Pittsburgh Crucible Steel Company, Midland, Pa., broke its record last month, the output being 15,476 tons.

The furnace of the Belfont Iron Works Company at Ironton, Ohio, was blown out April 6.

The furnace of the Perry Iron Company, Erie, Pa., was blown in on April 1.

Tod furnace of the Brier Hill Steel Company, at Youngstown, Ohio, was blown in on April 1. Both furnaces of this company are now in blast.

Mattie furnace of the Girard Iron Company, Girard, Ohio, was blown in March 31 and made its first cast on April 1.

Corrigan, McKinney & Co. blew in their No. 1 River furnace at Cleveland on foundry iron April 1. This firm now has both its Cleveland furnaces in blast, the No. 2 stack running on basic iron.

Soho furnace of the Jones & Laughlin Steel Company at Pittsburgh, idle for over a year, now completely rebuilt, was blown in March 28.

The Third Edison Benzol Recovery Plant

The third Edison benzol recovery plant, the contract for which but not the location was mentioned in *The Iron Age* of March 18, is being built in connection with the by-product coke plant of the Woodward Iron Company, Woodward, Ala. It will have a capacity of 2000 gallons per day and will be ready to operate about May 15. This plant, with those already mentioned in these columns, makes a total of eight benzol recovery plants in process of construction at iron and steel works in this country.

New Benzol Plant Near Birmingham, Ala.

BIRMINGHAM, ALA., April 7, 1915.—(*By Telegraph*).—President George G. Crawford, of the Tennessee Coal, Iron & Railroad Company, announces officially to-day that work is to start within a month at Fairfield, near this city, on a benzol plant with a daily capacity of 13,000 gal. Work on the 2000-gal. benzol plant of Thomas A. Edison, Inc., at Woodward, Ala., is well under way.

The Iron and Metal Markets

44 PER CENT INCREASE

Three Months' Gain in Steel-Making Pig Iron

Mill Shipments Heavy in March, but New Orders Generally Less

The pig-iron output of March is clear corroboration of the reports of recent weeks as to the higher rate of steel works operations. Since January 1 the net gain in furnaces in blast has been 44 and the yearly rate, which on January 1 was 18,000,000 tons, had mounted to the astonishing figure of 26,000,000 tons on April 1. The increase in three months was thus 44 per cent., practically all of it in steel-making pig iron.

Pig-iron production in March was 2,063,834 tons, or 66,575 tons a day, against 1,674,771 tons in February, or 59,813 tons a day. On April 1 furnaces in blast numbered 191 with capacity of 70,591 tons a day, against 176 active on March 1 with capacity of 63,033 tons a day. The present rate of production is the highest since April, 1914, when the expansion of the early months of last year was culminating.

Steel companies generally booked a smaller tonnage in the past week than they shipped. While it is well recognized that to advance prices when capacity is greater than consumption checks forward buying, opinion as to the future is still hopeful. At the same time it is admitted that the continuance of a 70 per cent. operation would be difficult without better railroad buying, unless this country should be called on to ship steel abroad at the present or even a greater rate in the next six months.

Youngstown district steel works have led in activity in recent weeks. Their output in a number of cases has been more than 90 per cent. of capacity, due to the fact that Youngstown mills produce chiefly wire, bars, sheets and wrought pipe, for which demand has been much better than for rails, plates and structural shapes.

March was marked by high rolling schedules in semi-finished steel, rails and plates at Carnegie Steel Company mills. Orders were sent to the mills for 316,000 tons of billets, sheet bars and rails—the largest month's total in more than a year—while 112,000 tons of plates were rolled, of which 92,000 tons were turned out at Homestead. The greatest previous record at the Homestead plate mills was 79,000 tons for a month.

The rail trade has not flourished lately and the distribution of the Pennsylvania Railroad's order promises to be further delayed. The Canadian mill at the Sault is reported to have closed two further contracts with Western roads for over 5000 tons each and the Southern Railway has placed 3700 tons at Ensley. The Nova Scotia rail mill is credited with a 30,000-ton contract for South Africa, with other African business pending.

In wire mill operations which in March made records at a number of plants, foreign orders cut a large figure. The spring demand for home consumption evidently has seen its high point.

The bar mills have had better orders from implement works and for concrete reinforcing. Prices have been better maintained in the Central West than in Chicago or in Eastern districts.

Fabricating works are making as low prices as at any time in six months, and work is coming up so slowly that improvement in this respect is not in sight. In the West building contracts are more numerous, but none are large.

Discounts on steel boiler tubes have been increased in the past week, by four points on tubes up to and including 3¼ in. and three points on 3½ to 13 in.; but all differentials to jobbers and retailers are wiped out, so that the new prices represent relatively slight reductions on most sizes.

Shafting prices have been firmer. While automobile and implement demand is only moderate, the machinery trade has been a heavy buyer.

The blowing in of several merchant furnaces has not improved the outlook for pig iron prices. Buffalo sellers, with nearly six months' business on their books, have advanced their quotations to $13 for No. 2X for any delivery. In the Central Western and Chicago districts the late Buffalo performance is not being repeated, as furnace companies are not making the concessions foundrymen appear to expect. At Detroit, however, an automobile company has just bought 10,000 tons of Northern iron at close to $13, delivered.

In eastern Pennsylvania inquiry has come up for 30,000 to 40,000 tons of basic iron. The last sales there several weeks ago were at $13.50 delivered, and a lower figure has been named in the close competition for the business now pending.

Considerable sales of Southern iron have been made to pipe and radiator interests. While $9.25, Birmingham, is still heard on prompt iron, $9.50 is the common basis for the second half of the year.

British pig iron and steel prices are steadily advancing. Hematite pig iron has gone to 105 shillings, and American billets have sold at 130 shillings c.i.f. Liverpool. Government control of works is extending.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month, and one year previous.

	Apr. 7, 1915.	Mar. 31, 1915.	Mar. 10, 1915.	Apr. 1, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	$14.25	$14.25	$14.25	$15.00
No. 2, Valley furnace	12.75	12.75	13.00	13.25
No. 2 Southern, Cin'ti	12.15	12.15	12.40	13.75
No. 2, Birmingham, Ala.	9.25	9.25	9.50	10.50
No. 2, furnace, Chicago*	13.00	13.00	12.75	14.25
Basic, del'd, eastern Pa.	13.50	13.50	13.50	14.25
Basic, Valley furnace	12.50	12.50	12.50	13.00
Bessemer, Pittsburgh	14.55	14.55	14.55	14.90
Malleable Bess., Ch'go*	13.00	13.00	13.00	14.25
Gray forge, Pittsburgh	13.45	13.45	13.45	13.65
L. S. charcoal, Chicago	15.75	15.75	15.75	15.25
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.15	1.15	1.15	1.22½
Iron bars, Pittsburgh	**1.20**	1.10	1.10	1.35
Iron bars, Chicago	**1.15**	1.12½	1.10	1.17½
Steel bars, Pittsburgh	**1.20**	1.15	1.15	1.15
Steel bars, New York	1.319	1.319	1.319	1.31
Tank plates, Pittsburgh	**1.15**	1.10	1.10	1.15
Tank plates, New York	1.269	1.269	1.269	1.31
Beams, etc., Pittsburgh	**1.20**	1.15	1.15	1.15
Beams, etc., New York	1.269	1.269	1.319	1.31
Skelp, grooved steel, P'gh	1.12½	1.12½	1.10	1.20
Skelp, sheared steel, P'gh	1.17½	1.17½	1.15	1.25
Steel hoops, Pittsburgh	1.25	1.25	1.25	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville, Per Net Ton at Oven:	Apr. 7, 1915.	Mar. 31, 1915.	Mar. 10, 1915.	Apr. 1, 1914.
Furnace coke, prompt...	$1.50	$1.50	$1.50	$1.85
Furnace coke, future....	1.65	1.65	1.65	2.00
Foundry coke, prompt...	2.00	2.00	2.00	2.40
Foundry coke, future....	2.15	2.15	2.15	2.55
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh.	20.00	20.00	19.50	21.00
O.-h. billets, Pittsburgh..	20.00	20.00	19.50	21.00
O.-h. sheet bars, P'gh...	21.00	21.00	20.50	22.00
Forging billets, base, P'gh	25.00	25.00	24.00	25.00
O.-h. billets, Phila.....	21.52	21.52	21.52	23.40
Wire rods, Pittsburgh...	25.00	25.00	25.00	26.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	12.00	12.00	12.00	12.75
Iron rails, Philadelphia..	13.00	13.00	13.00	16.50
Carwheels, Chicago	9.75	9.75	10.00	11.75
Carwheels, Philadelphia.	11.00	11.00	11.00	12.00
Heavy steel scrap, P'gh.	12.00	12.00	12.00	12.00
Heavy steel scrap, Phila	11.00	11.00	10.50	11.00
Heavy steel scrap, Ch'go.	*9.00*	9.25	9.75	9.75
No. 1 cast, Pittsburgh...	12.00	12.00	11.25	11.50
No. 1 cast, Philadelphia.	12.00	12.00	12.00	13.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	10.25
Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	1.80	1.80	1.80	1.95
Galv. sheets, No. 28, P'gh	*3.30*	3.40	3.40	2.95
Wire nails, Pittsburgh...	1.60	1.60	1.60	1.60
Cut nails, Pittsburgh....	1.55	1.55	1.55	1.65
Fence wire, base, P'gh..	1.40	1.40	1.40	1.40
Barb wire, galv., P'gh...	2.10	2.10	2.10	2.00
Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	**17.25**	17.00	15.25	14.87½
Electrolytic copper, N. Y.	**15.87½**	15.62½	14.75	14.37½
Spelter, St. Louis.....	**9.37½**	9.25	11.00	5.12½
Spelter, New York.....	**9.62½**	9.50	11.25	5.27½
Lead, St. Louis.....	4.12½	4.12½	3.87½	3.70
Lead, New York.....	**4.20**	4.15	3.95	3.80
Tin, New York.....	*37.25*	52.00	47.00	37.90
Antimony, Hallett's, N. Y.	**32.00**	29.00	25.00	6.75
Tin plate, 100-lb. box, P'gh	*$3.25*	$3.35	$3.20	$3.30

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal has no stability, being dependent on vessel charges.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c. to 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in....	.10
Gauges under 3-16 in. to and including No. 8....	.15
Gauges under No. 8 to and including No. 9....	.25
Gauges under No. 9 to and including No. 10...	.30
Gauges under No. 10 to and including No. 12...	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft. to 2 ft. inclusive..	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive..	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.15c. to 1.20c.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $1.90. Galvanized barb wire and staples, $2.10; painted, $1.60. Wire nails to jobbers, $1.60. Galvanized nails, 1 in. and longer, $1.20 advance over base price; shorter than 1 in., $1.70 advance over base price. Woven wire fencing, 72 per cent. off list for carloads; 71 off for 1000-rod lots; 70 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized ...	2.00	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wire Rods.—Bessemer, open-hearth and chain rods, $25.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 11, 1915, and iron pipe from February 12, 1915, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜...	73	52½	⅛ and ¼.....	66	47
½	77	65½	⅜	65	44
¾ to 3.....	80	69½	½	69	54
			¾ to 2½.....	72	59

Lap Weld

2	77	66½	1¼	56	43
2½ to 6.....	79	68½	1½	67	54
7 to 12.....	77	66½	2	68	56
13 and 14	63½	..	2½ to 4.....	70	59
15	61	..	4½ to 6.....	70	59
			7 to 12.....	68	58

Reamed and Drifted

1 to 3, butt.....	78	67½	1 to 1½, butt...	70	57
2, lap	75	64½	2, butt	70	57
2½ to 6, lap....	77	66½	1¼, lap	54	41
			1½, lap	65	52
			2, lap	66	54
			2½ to 4, lap.....	68	57

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜.....	68	55½	⅜	63	50
½	73	64½	½	67	58
¾ to 1½.....	77	68½	¾ to 1½.....	71	60
2 to 3.....	78	69½	2 and 2½.....	72	61

Lap Weld, extra strong, plain ends

2	74	63½	1½	65	55
2½ to 4.....	76	65½	2	66	57
4½ to 6.....	75	64½	2½ to 4.....	70	59
7 to 8	69	58½	4½ to 6.....	69	58
9 to 12.....	64	53½	7 to 8.....	63	53
			9 to 12.....	58	47

Butt Weld, double extra strong, plain ends

½	63	54½	½	57	47
¾ to 1½.....	66	57½	¾ to 1½.....	60	50
2 to 2½.....	68	59½	2 and 2½.....	62	52

Lap Weld, double extra strong, plain ends

2	64	55½	2	58	47
2½ to 4.....	66	57½	2½ to 4.....	60	52
4½ to 6.....	65	56½	4½ to 6.....	59	51
7 to 8.....	59	48½	7 to 8	52	42

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from April 1, 1915, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.....	66	1½ in.	45
2¼ in.	63	1¾ and 2 in.....	49
2½ and 2¾ in.....	69	2¼ in.	45
3 and 3½ in.....	74	2½ and 2¾ in.....	54
3½ and 4½ in.....	75	3 and 3¼ in.....	57
5 and 6 in.....	68	3½ and 4½ in.....	60
7 to 13 in.....	65	5 and 6 in.....	49

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., 10 per cent. net extra.

2 in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River, must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points. On standard charcoal iron tubes for desirable orders the above discounts are shaded an extra 5, and occasionally two 5's by some makers.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots

from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.25 to 1.30
Nos. 9 to 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.45 to 1.50
No. 12	1.45 to 1.50
Nos. 13 and 14	1.50 to 1.55
Nos. 15 and 16	1.55 to 1.60
Nos. 17 to 21	1.60 to 1.65
Nos. 22 and 24	1.65 to 1.70
Nos. 25 and 26	1.70 to 1.75
No. 27	1.75 to 1.80
No. 28	1.80 to 1.85
No. 29	1.85 to 1.90
No. 30	1.95 to 2.00

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	2.30 to 2.40
No. 12	2.40 to 2.50
Nos. 13 and 14	2.40 to 2.50
Nos. 15 and 16	2.55 to 2.65
Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.85 to 2.95
Nos. 25 and 26	3.00 to 3.10
No. 27	3.15 to 3.25
No. 28	3.30 to 3.40
No. 29	3.45 to 3.55
No. 30	3.60 to 3.70

Pittsburgh

PITTSBURGH, PA., April 6, 1915.

Last week the Bessemer and open-hearth steel plants of the Steel Corporation in this vicinity operated to about 70 per cent. of capacity, while at Youngstown the Republic, Carnegie, Brier Hill and Youngstown Sheet & Tube companies operated at probably 90 per cent. When it is considered that the railroads are buying but little, this high rate of operations is remarkable; it is maintained only by reason of the fact that the foreign demand for steel products has been good. Putting the grand general average of operations at 65 per cent., and this is believed to be conservative, it is estimated that 15 per cent. and perhaps slightly more of the output of the Bessemer and open-hearth steel works is being sent abroad in the shape of war materials. March was a record-breaker in output of steel plates and wire, and April is expected to be fully as heavy. There was no important change in the situation in the past week, a full test of the stability of the higher prices on plates, shapes and bars not yet having been made on account of light buying. Sheets, tin plate and wire products are active, with heavy foreign shipments being made. The local pig-iron and steel markets are quiet, with prices ruling fairly firm. The average of prices obtained in March on hot finished mill products was slightly higher than in February, and it is believed will be higher in April than last month. While the immediate situation is satisfactory the mills are not filled up far ahead, and it is therefore a question whether an average rate of operations of 65 per cent. can be maintained for any considerable length of time.

Pig Iron.—W. P. Snyder & Co. report the average price of Bessemer iron in March to have been $13.60, and of basic $12.50, both f.o.b. Valley furnace, being the same average prices as prevailed in February. There is little local inquiry for pig iron, especially for basic and Bessemer, but small lots of No. 2 foundry are being sold steadily at $12.75 to $13, Valley furnace. More inquiry has developed for basic iron for shipment to Italy, and a lot of 1500 tons is expected to be shipped from a Shenango Valley furnace as soon as cargo space can be secured. Nominal prices of pig iron are as follows: Bessemer iron, $13.60; basic, $12.50; malleable Bessemer, $12.75; No. 2 foundry, $12.75 to $13; and gray forge, $12.50, all at Valley furnace, with a freight rate of 95c. a ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—In March the billet and rail sales bureau of the Carnegie Steel Company sent to the mills rolling orders for over 316,000 tons of products, mostly billets, sheet bars and steel rails, an increase over February of about 65,000 tons. March was the heaviest month in this bureau for more than a year. We note sales of 3000 to 4000 tons of small Bessemer and open-hearth billets for forward delivery at $21, Pittsburgh. Specifications against contracts for billets and sheet bars continue very active. We quote Bessemer and open-hearth billets at $19, and Bessemer and open-hearth sheet bars, $19.50, f.o.b. maker's mills, Youngstown; Bessemer and open-hearth billets, $20, and Bessemer and open-hearth sheet bars, $21, f.o.b. Pittsburgh. Forging billets are quoted at $25 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. Axle billets are quoted at $21 to $22.

Ferroalloys.—It is reported that a cargo of 5000 tons of 80 per cent. ferromanganese left England recently and is shortly due in Baltimore, but the report is not confirmed here. Less uneasiness is observed among users of ferromanganese as to their future supply, partly because the Carnegie Steel Company has already helped out consumers by selling them domestic ferromanganese for prompt shipment, and will likely continue to do so until foreign material comes along regularly. We note sales of four or five cars of 80 per cent. English and domestic ferromanganese at $95 to $100 per ton delivered, Pittsburgh. New inquiry is light. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71; delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $17; 11 per cent., $18, and 12 per cent., $19, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads, 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Structural Material.—The local market is dull. No large jobs were placed the past week, and none is in sight that is expected to be placed soon. Local fabricating shops are short of work and are naming low prices on the small orders that are coming out. We quote beams and channels up to 15-in. at 1.20c., Pittsburgh, for second quarter, and 1.25c. for third quarter. It is stated that so far there has been very little buying at these prices.

Plates.—In March the Carnegie Company made 112,000 tons of plates, of which 92,000 tons were rolled at the Homestead works and the other 20,000 tons on its smaller plate mills at Sharon and at the Upper Union and Lower Union mills in this city. The previous heaviest output of plates at the Homestead works was 79,000 tons. No new demand is coming for plates from the steel car companies and there are no important car orders in sight. It is not believed that the present high rate of output in plates, especially by the larger mills, can be kept up long unless orders for steel cars come out. Prices on plates are not so firm as on shapes and bars. While 1.20c., Pittsburgh, is the quoted price by the large mills for second quarter, it is likely 1.15c. would be accepted by some mills. It is said two or three fairly large contracts for ¼-in. and heavier plates have been placed at 1.25c. for third quarter delivery, but this is not confirmed.

Steel Rails.—The Carnegie Company has taken 1300 tons of standard sections for the Buffalo, Rochester & Pittsburgh for prompt delivery. No further foreign contracts have been placed, and there is no new inquiry. The demand for light rails is active from the traction companies and the lumber interests, but the coal companies are not buying very heavily. The Carnegie Company received new orders and specifications in the past week for about 4000 tons of light rails. We quote standard section rails made of Bessemer stock at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10 lb. section, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. The prices of light rails are materially shaded on large lots, and the rerolling mills are underselling makers of rails rolled from billets from 50c. to $1 per ton.

Sheets.—The new demand is excellent and specifications are good. For high grade sheets used by

automobile builders, specifications are heavy, some of these consumers having already taken out the full allotment on their contracts and being about ready to make new ones. Export business is active, especially in galvanized sheets, of which large quantities are being sent to China and Japan. This week the American Sheet & Tin Plate Company is operating to about 69 per cent. of hot sheet mill capacity, and independent mills are operating all the way from 65 to 100 per cent., the higher rates being reached by two or three mills. Due to the decline in spelter, some mills are quoting slightly lower prices on galvanized sheets. We quote No. 28 Bessemer black sheets at 1.80c. to 1.85c.; No. 28 galvanized at 3.30c. to 3.40c.; Nos. 9 and 10 blue annealed sheets 1.30c. to 1.35c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Tin Plate.—Heavy orders for bright plate for export continuue to be placed, the American Sheet & Tin Plate Company having taken recently 40,000 boxes for shipment to Shanghai, China. Domestic demand is quiet and only for small lots, but can makers are specifying heavily against contracts. On the small orders being placed prices range from $3.25 to $3.35 for 14 x 20 coke plates, depending on the order.

Wire Rods.—There is not much foreign inquiry and the new domestic demand is dull, as most consumers are covered by contracts placed some time ago for delivery up to July. Specifications are only fairly active. We quote Bessemer, open-hearth and chain rods at $25 to $26, f.o.b. Pittsburgh, the latter price for small lots.

Steel Car Wheels.—No orders of moment have been placed for some time, and no large business is in sight. We quote standard 33-in. freight carwheels, 6¼-in. rough bore, at $15, and standard 36-in. passenger, the same bore, at $21 per wheel, f.o.b. Pittsburgh.

Shafting.—Prices are firm and there is some talk of another advance of possibly 2 points on shafting in the near future. Specifications against contracts from the automobile trade and from implement makers are only fair, but from the machine-tool builders are very heavy, a good part of the output of shafting at present going to this class of consumers. New demand and specifications for shafting at present amount to about 65 per cent. of capacity. We quote cold-rolled shafting at 69 to 70 per cent. off in carload and larger lots, and 64 to 65 per cent. on small lots, f.o.b. Pittsburgh, freight to destination added.

Railroad Spikes.—There is very little new inquiry as most railroads have covered their needs for this year, but specifications are coming in quite freely. Prices are firm, but no higher. We quote: Standard railroad spikes, $1.35 to $1.40; small railroad spikes, $1.45 to $1.50 in carload and larger lots, f.o.b. Pittsburgh.

Hoops and Bands.—As yet, little business has been placed at the new price of 1.20c. for bands for second quarter delivery, but some inquiries are in the market, and also for shipment in third quarter at 1.25c. Most consumers are covered by contracts placed some time ago at lower prices, on which specifications are coming in at a fair rate. We quote steel bands at 1.20c. on new orders for second quarter shipment, and 1.25c. for third quarter, and steel hoops at 1.25c. to 1.30c. at mill.

Skelp.—There is some activity in the skelp market, new demand being better than for a long time. There is also some foreign inquiry. Skelp mills have more business on their books at present than at any time in nearly a year. Prices are firm. We quote: Grooved steel skelp, 1.12½c. to 1.15c.; sheared steel skelp, 1.17½c. to 1.20c.; grooved iron skelp, 1.50c. to 1.55c.; sheared iron skelp, 1.60c. to 1.65c., delivered to consumers' mills in the Pittsburgh district.

Wire Products.—There is still a heavy foreign inquiry for barb wire, but much of this fails to materialize into actual orders. However, shipments by the leading makers on export orders are heavy and represent a large part of the output of the mills. The American Steel & Wire, Jones & Laughlin, Youngstown Sheet & Tube companies, and one or two other makers of wire products had the heaviest output in March of any one month in a long time. Specifications from the domestic trade are only fair, and the new demand is falling off. Several of the larger makers are still quoting $2.10 on galvanized barb wire, not having adopted the new price named recently by the leading interest. Mills quote to jobbers as follows: Wire nails, $1.60; galvanized nails 1 in. and shorter taking an advance of $1.70 over this price, or $3.30, and galvanized nails, 1 in. and longer, an advance of $1.20, or $2.80; plain annealed wire, $1.40; galvanized barb wire and fence staples, $2.10 to $2.20; painted barb wire, $1.60, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. for cash in 10 days. We quote woven wire fencing at 72 per cent. off in carload lots, 71 per cent. off on 1000-rod lots and 70 per cent. on small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—If 50,000 tons of 2 to 3-in. steel rounds is secured by the Steel Corporation for shipment to France it will be rolled at the Duquesne works of the Carnegie Steel Company. There is another inquiry out for 30,000 tons, and this is expected to be placed probably this week. The new demand for merchant steel bars is active, the output of the larger makers in March having been the heaviest in any one month for more than a year. Reinforcing steel bars are in heavier request and two or three good-sized inquiries are in the market. Prices on common iron bars have improved, due to the higher costs of raw material. We quote steel bars on new orders at 1.20c. for second quarter delivery, and 1.25c. for third quarter. We quote common iron bars, made from part scrap, at 1.20c., and test iron bars at 1.30c., f.o.b. Pittsburgh.

Merchant Steel.—The new demand is better. Several leading makers state that their orders and shipments in March were the heaviest in any one month for more than a year. Specifications against contracts are coming in more freely. Prices are firm but no higher. On small lots we quote: Iron finished tire, ½ x 1½ in. and larger, 1.30c. base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c. base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c.

Cold-Rolled Strip Steel.—The new demand is better than for some months and makers report specifications very active. Two makers of cold-rolled strip steel are now operating their works at full 100 per cent. of capacity, for the first time in more than a year. Small sales have been made at as high as $2.85 base. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edges, per 100 lb., $2.75, delivered. Extras, which are standard among all the mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	$0.25	$0.10
0.099 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Nuts and Bolts.—Makers of nuts and bolts have adopted slightly higher discounts, which went into effect April 1. The new demand is only fair and mostly for small lots, as consumers are pretty well covered

up to July. Discounts on the heavier nuts and bolts, effective from April 1, are as follows:

U. S. S. Cold Punched Blank and Tapped, Chamfered, Trimmed and Reamed

½ in. and smaller hex	8.2c. per lb. off
⅝ in. and larger hex	7.4c. per lb. off
Square, all sizes	5.9c. per lb. off

Semi-Finished

½ in. and smaller hex	85-10-10-10 off
⅝ in. and larger hex	85-10-10 off

Black Bulk Rivets

7/16 x 6½, smaller and shorter	80-10-5 off

Package Rivets 1000 Pcs.

Black, metallic tinned and tin plated	75-10-10 off

Structural Rivets.—The new demand for both structural and boiler rivets is dull and prices are only fairly steady. We quote structural rivets at 1.40c., and conehead boiler rivets at 1.50c., f.o.b. Pittsburgh. On an attractive order these prices would be shaded.

Wrought Pipe.—Both wrought-iron and steel pipe are in fairly active demand. Several large gas and oil lines now in the market are expected to be placed in the near future. Orders entered in March by two of the larger steel pipe mills showed a slight increase over February. Discounts on both iron and steel pipe are slightly shaded on desirable orders.

Boiler Tubes.—Effective April 1, the National Tube Company issued a new card on steel boiler tubes on which discounts up to 3¼-in. were increased four points and on 3½ up to 13-in., three points. Under ordinary conditions, these increases in discounts would represent reductions in prices of $8 a ton on sizes up to 3¼-in., and $6 on 3½-in. and larger, but all differentials have been wiped out, and these almost equalize the increase in discounts, so that while on some sizes the new discounts figure out a reduction of $1 to $2 a ton, on a few sizes they represent a similar advance. A new departure has been made by the fact that on less than carload lots steel boiler tubes are now sold f.o.b. Pittsburgh, the buyer paying the freight to destination. On carload lots, freight is prepaid and charged to the buyer.

Old Material.—Interest centers on the prices bid by dealers on the Pennsylvania Railroad scrap list, on which awards will be made not later than April 9. It is expected that the heavy steel scrap may be bought by a local consumer, who purchased it in March. Little is doing in the local scrap trade, which is simply marking time. Consumers seem to be well covered, and dealers are not anxious to sell short at present prices, as the visible supply is not large. No important sales were made the past week. For delivery in Pittsburgh and nearby districts that take Pittsburgh freights, dealers quote about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$12.00 to $12.25
Compressed side and end sheet scrap	10.25 to 10.50
No. 1 foundry cast	12.00 to 12.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock	10.00 to 10.25
Railroad grate bars	8.50 to 8.75
Low phosphorus melting stock	13.25 to 13.50
Iron car axles	18.75 to 19.25
Steel car axles	13.25 to 13.75
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	9.75 to 10.00
No. 2 busheling scrap	7.00 to 7.25
Machine shop turnings	8.00 to 8.25
Old carwheels	10.75 to 11.00
Cast-iron borings	8.25 to 8.50
*Sheet bar crop ends	12.00 to 12.25
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.75 to 11.00
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	10.75 to 11.00

*Shipping point.

Coke.—Nothing has yet been done on the inquiry of the Pittsburgh Steel Company for 18,000 to 20,000 tons of blast furnace coke per month for the 12 months from July 1. The Eastern Steel Company has bought about 15,000 tons for April delivery from the Producers Coke Company, Uniontown, Pa., at the reported price of $1.65 per net ton at oven. New inquiry for coke is quiet. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions for the week ended March 27 as 285,237 net tons, an increase over the previous week of nearly 6000 tons. We quote standard makes of blast-furnace coke for prompt shipment from $1.50 to $1.60; on contracts for delivery up to July 1, $1.65, and for delivery over all of 1915, at $1.75 per net ton at oven. Foundry coke, standard makes, prompt, $2 to $2.25; contracts, $2.15 to $2.30.

Chicago

CHICAGO, ILL., April 7, 1915.—(*By Wire.*)

Whatever may be the particular disappointments that color the individual outlook on the business situation, the general fact remains that steel-making operations have increased from 25 per cent. of capacity December 1 to 70 per cent. of capacity April 1. These four months have shown a continuous progress in the direction of a larger volume of business and at this time each successive week puts a heavier aggregate on the books. Buying is still restricted to what is needed promptly and affords no immediate prospect of a backlog for the mills, but specifications are well distributed in all products and there is a degree of real improvement not to be discounted. The end of the first quarter, bringing with it the withdrawal of low prices, saw the placing of substantial specifications for plates, shapes and bars. Local fabricators report a much more favorable prospect for business, although no large jobs are in sight. Labor difficulties at Chicago are again curtailing the market for building steel out of store. Absence of car buying is cutting into the tonnage of shapes and plates normally available. The inquiry for a total of about 3500 cars from three Western roads is still pending and seems unlikely of early placement. Additional rail buying in sight does not exceed 5000 tons, but there is a report of further activity on the part of the Canadian mill. The merchant trade in bars is making a better showing, and miscellaneous specifications for sheets are in such volume as to necessitate heavier mill operations. A number of desirable amounts of Northern pig iron were put on the books during the week, but activity in this market is still sub-normal. Tenders are to be received at Sacramento for 10,000 tons of cast-iron pipe, but municipal demand elsewhere is on a small scale. Prices for scrap are decidedly weak.

Pig Iron.—Southern iron for delivery in this market is now on a well-defined price level for last half delivery. Quotations of $9.50, Birmingham, are being made and some business taken. Prompt shipment iron from the South for second quarter may be had at $9.25, Birmingham, although this price is in the nature of a concession. Several transactions in local irons are noted in lots of 1000 to 2000 tons. While more than one interest has been active in this respect, the wider range of analysis which the Indiana Harbor furnaces are now enabled to offer by reason of their acquisition of a new ore supply on the Cuyuna range has made that seller an important factor. Inquiry put out in this district following recent heavy sales in the East for the purpose of testing the attitude of local producers seems not only to have failed in its intent to weaken prices, but to have brought out a firmer attitude represented by the limiting of the $13 furnace quotation to third quarter, with an advance of 50c. for the last half. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	$15.75
Lake Superior charcoal, No. 1	16.25
Lake Superior charcoal, No. 6 and Scotch	16.75
Northern coke foundry, No. 1	$13.25 to 13.50
Northern coke foundry, No. 2	13.00 to 13.25
Northern coke foundry, No. 3	12.50 to 13.00
Southern coke, No. 1 f'dry and 1 soft	13.75 to 14.25
Southern coke, No. 2 f'dry and 2 soft	13.50 to 13.75
Malleable Bessemer	13.00 to 13.25
Standard Bessemer	15.50
Basic	12.50 to 13.00
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. silv'y, 10 per cent.	18.90 to 19.40

(By Mail)

Rails and Track Supplies.—Practically no rail tonnage was placed in this market last week, and the only inquiries of note are the 2000 tons for the Toledo, St. Louis & Western and 1200 tons for the Missouri, Kansas & Texas. Reports indicate that the Canadian mill at the Soo has not yet ceased its efforts to secure rail business in this country, as negotiations have been successfully concluded, involving over 5000 tons each, for a transcontinental line out of St. Louis and a road out of Kansas City. The delay in rolling rails at South Chicago as the result of the recent flywheel accident is not expected to exceed six weeks and it is understood that there will be no occasion for transferring this work to other mills of the Illinois Steel Company. We quote standard railroad spikes at 1.45c. to 1.50c., base; track bolts with square nuts, 1.90c., base, all in carload lots, Chicago; tie plates, $23.50 to $25; f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

Structural Material—Local fabricators report that they now have figures out on a larger number of proposals covering structural work than there has been occasion for in many months. These jobs are almost entirely of small tonnages, but they reflect a very gratifying improvement in general conditions. A dozen contracts reported closed last week aggregate about 4500 tons, in which are included 344 tons for an addition to Mercy Hospital, Chicago, to the Hansell-Elcock Company; 627 tons to the North works, Illinois Steel Company, for the new benzol plant at the Gary works; 253 tons for a bridge span in Whatcom County, Wash., to the Toledo Bridge & Crane Company; 208 tons for the Sibley mine, Ely, Minn., to the American Bridge Company; 118 tons for a school at Dubuque, to A. Bolter's Sons, and 146 tons for bridge spans in Oregon, to the Central States Bridge Company. Mill specifications for structural shapes last week continued to show some increase in volume, although the lack of car business is making itself keenly felt. The inquiries of the Minneapolis & St. Louis, the International & Great Northern and Missouri, Kansas & Texas for 1000 to 1200 cars each, are still pending, together with several inquiries for small additions to passenger equipment. The Illinois Central will buy 100 gondolas from the American Car & Foundry Company. The closing days of March occasioned a brief period of conspicuous activity, as buyers, generally, hastened to anticipate the withdrawal of the low prices applicable to their first quarter contracts. We quote for Chicago delivery of structural shapes from mill 1.30c. to 1.389c. for the second quarter and 1.439c., for the last half.

Buying of materials for building work from store is much curtailed by the threatened labor difficulties in the Chicago building trades. We quote for stock structural material, 1.75c.

Plates.—The termination of first quarter contracts contributed to the booking of good plate specifications last week, to which was added some new tonnage of tank steel. New benzol recovery plants for the Illinois Steel Company, Inland Steel Company and the Solvay coke plant, at Milwaukee, will take a round tonnage of plates, the contract for the Gary plant, amounting to 1694 tons, being placed with John Mohr & Sons, Chicago, for fabrication. There is some further inquiry for locomotives from the West, but car plates are exceedingly scarce. For plates from mill, for second quarter delivery, we quote 1.30c. to 1.389c., and for last half, 1.439c.

Store trade in plates shows the usual first week of the month activity, although that is simply relative and suggests no exceptional increase. We continue to quote for plates out of stock 1.75c.

Sheets.—Tonnage in black and in blue annealed sheets has picked up, but prices continue soft. The mill at Indiana Harbor is again on a rolling schedule requiring all of its mills. There appears to be plenty of galvanized sheet business in sight, but the mills are taking on these orders sparingly. A considerable range in quotations for galvanized sheets is appearing Irregularities in the receipt of spelter consignments continue. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.489c.; No. 28 black, 1.939c.; No. 28 galvanized, 3.489c. to 3.589c.

We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.65c. to 3.75c.

Bars.—The merchant-bar trade is showing improvement, due, most conspicuously, to better specifications from the implement trade and the demand for reinforcing steel, but, in addition, there is a substantial growth in the general demand for bars for miscellaneous uses. Of iron bars the tonnage is light, but prices are decidedly firm. There appears to be a uniform acceptance of 1.15c., Chicago, as a minimum, despite the fact that bar-iron mill operations in this district are intermittent and average scarcely more than 60 per cent. of capacity. We quote for mill shipments as follows: Bar iron, 1.15c.; soft steel bars, 1.30c. to 1.389c.; hard steel bars, 1.20c.; shafting, in carloads, 65 to 68 per cent. off; less than carloads, 60 to 65 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 62 per cent. off.

Rivets and Bolts.—The firm attitude of the makers of the semi-finished materials from which bolts and nuts are made makes possible the much more uniform and well defined market now existing for these products. Heavier specifications in which the agricultural implement manufacturers especially are figuring also contribute to an improved situation. The demand for rivets continues relatively light. Quotations are as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-15; cut thread, 80-10; larger sizes, 75-17½; machine bolts up to ⅜ x 4 in., rolled thread, 80-20; cut thread, 80-15; larger sizes, 80-2½; coach screws, 85-2½; hot pressed nuts, square, $6.60 to $6.40 off per cwt.; hexagon, $7.60 to $7.30 off per cwt. Structural rivets, ¾ to 1¼ in., 1.50c. to 1.55c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to ⅜ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅜ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Old Material.—Dealers in scrap are finding it exceedingly difficult to move the material that is coming in on track, particularly in such grades as car axles, knuckles, couplers, springs and foundry scrap, to say nothing of the movement of past accumulations. Heavy melting steel, wrought scrap and busheling are also weak, although the rolling mills have taken some small quantities of the latter grades during the week. The market activity is largely confined to making deliveries on old orders. Railroad scrap, for which figures are being asked, aggregates about 12,500 tons, of which the important list is that of the Baltimore & Ohio, about 10,000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	$12.00 to $12.25
Old steel rails, rerolling	10.25 to 10.75
Old steel rails, less than 3 ft.	10.00 to 10.50
Old carwheels	9.75 to 10.00
Heavy melting steel scrap	9.00 to 9.50
Frogs, switches and guards, cut apart	9.00 to 9.50
Shoveling steel	8.75 to 9.00
Steel axle turnings	7.00 to 7.25
Per Net Ton	
Iron angles and splice bars	$11.50 to $12.00
Iron arch bars and transoms	11.75 to 12.25
Steel angle bars	8.50 to 8.75
Iron car axles	13.50 to 14.00
Steel car axles	10.75 to 11.25
No. 1 railroad wrought	8.75 to 9.00
No. 2 railroad wrought	8.25 to 8.75
Cut forge	8.25 to 8.75
Steel knuckles and couplers	8.25 to 8.75
Steel springs	8.75 to 9.25
Locomotive tires, smooth	8.50 to 9.00
Machine shop turnings	5.25 to 5.50
Cast borings	4.75 to 5.25
No. 1 busheling	7.50 to 8.00
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	5.50 to 6.00
Boiler punchings	8.25 to 8.50
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	7.75 to 8.00
Grate bars	7.50 to 7.75
Railroad malleable	8.00 to 8.25
Agricultural malleable	7.25 to 7.50
Pipes and flues	6.50 to 6.75

Cast-Iron Pipe.—Except for the proposed purchase of 10,000 tons of pipe for Sacramento, Cal., for which bids are to be received the present month, the pipe business in sight is confined to comparatively small lots. At Sandusky, O., there is 550 tons; at Jackson, Mich., 250 tons; at McCune, Kan., 200 tons, and at Manitowoc, Wis., 100 tons. Prices are unchanged. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $23.50; 16 in. and up, $23, with $1 extra for gas pipe.

Wire Products.—With dealers' stocks well filled, the movement of wire for the spring trade appears to be waning. A fair tonnage of specifications is still coming in for fencing, but the demand for nails is lighter. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.589; wire nails, $1.789; painted barb wire, $1.789; galvanized barb wire, $2.289 to $2.389; polished staples, $1.789; galvanized staples, $2,289 to $2.389, all Chicago.

Philadelphia

PHILADELPHIA, PA., April 6, 1915.

The demand for finished and semi-finished steel products shows a pronounced betterment. Some mills are more active than others in booking orders and specifications, but, even with the least favored, business is holding its own. Structural material makes the poorest showing. The advance of $1 per ton, April 1, on plates, shapes and bars had an excellent effect in causing consumers to come in under contracts and options which they previously had entered. It is now seen that March was a much better month than February, not only because of the greater tonnage booked, but also because of a greater diversity of products demanded. The export demand continues good, but far more pleasing is the increased activity of domestic consumers. In wire and wire products one company did the largest month in its history. Additional business has been done in shrapnel steel, and thousands of tons are pending which eventually will go to Russia. In addition to previous sales of the kind, an Eastern mill has sold 10,000 tons of steel croppings for delivery to Italy. Makers of plates had the most satisfactory week of months. Foundry grades of pig iron have not shown much activity, but there is a feeling of confidence on the part of both buyers and sellers and the signs point to an early movement in steel-making iron. Relief is promised for the ferromanganese situation by the end of this month. Weakness has developed in heavy melting steel, and but little interest is shown in old material generally.

Pig Iron.—There is little change so far as new business is concerned, but a better feeling exists on the part of both consumers and sellers. The recent low prices at which business was done by Buffalo interests are receding, now that the heavier part of the movement is past. One Buffalo producer quotes $13 at furnace for second quarter and announces that, if indications hold true, quotations for the last half will be advanced correspondingly. Foundries in this section are taking deliveries in a satisfactory way, and many of them are melting slightly more iron. Meanwhile the demand continues to be mostly for small lots, among the best of which may be mentioned a sale of 750 tons of Virginia iron and another of 500 tons. Virginia furnace stocks showed a very slight increase at the end of March. A prominent seller of Southern iron reports a quiet week, but the rumor persists that local pipe makers have bought heavily on the basis of $9.25 to $9.50, Birmingham, for No. 2. In low phosphorus little interest has been shown. There is some feeling about for basic, though it has not yet culminated in business. The last sales reported were at $13.50, delivered, but sellers hold to the belief that they should now get $14. Inquiries for export continue to be figured on, but generally they have been unproductive. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X, foundry	$14.25 to $14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia, No. 2 X, foundry	15.25
Virginia No. 2 plain	15.00
Gray forge	13.25 to 13.50
Basic	13.50
Standard low phosphorus	20.00 to 20.50

Ferroalloys.—Advices have been received from abroad which indicate that the tenseness of the situation will be relieved in the latter part of this month by fairly liberal arrivals from England. At the same time most of the ferromanganese expected to arrive will be quickly absorbed by deliveries on contracts which have been held in abeyance for months. The nominal quotation for 80 per cent. material is $78, Baltimore, but small lots have been sold at from 6 to 7c. per lb. Approximately 1000 tons have arrived at this port and Baltimore in the past few days, all intended for a leading steel interest by special arrangement with the British Government. The quotations for 50 per cent. ferrosilicon are unchanged at $71 to $73, Pittsburgh.

Bars.—Specifications for steel bars were freely entered just prior to April 1 at 1.259c. and 1.309c., Philadelphia. Consumers were stirred to action by the announcement that 1.359c. would become effective on the first of the month. Concrete reinforcing bars were less active. Iron bars are firmer at 1.15c. to 1.20c., Philadelphia.

Plates.—In the last two or three days of March, consumers specified against contracts in a most satisfactory manner and in so doing replenished their stocks at 1.309c., Philadelphia, or less. Since April 1, 1.359c., Philadelphia, has been quoted for second quarter delivery in carload lots. Some business at the latter price has been done. For the third quarter 1.409c., Philadelphia, is asked. While most of the business has come from miscellaneous directions, the shipyards have been good contributors and the railroads also have been a factor, presumably to enable them to make repairs. The Newport News Shipbuilding & Dry Dock Company has received an order from a Boston steamship company for a 375-ft. vessel.

Rails.—New business is light, especially as regards domestic needs. Some foreign inquiries are still under negotiation. The Pennsylvania Steel Company has received an order for 1150 tons of girder rails from the Rhode Island Company.

Structural Material.—The structural end of the steel business continues to make a poorer showing than other products, although specifications for plain shapes picked up a little near the close of March. As was expected, 1.359c., Philadelphia, became effective April 1. The Belmont Iron Works will supply 600 tons of fabricated shapes for the apartment house to be erected in this city from designs by Frederick Webber. The warehouse for the Hunter & Dickson Company, this city, requiring about 150 tons, is still pending. A few good propositions from coal-mining companies are looked for soon.

Sheets.—Demand is a little better, though not yet sufficiently strong to stimulate prices. Quotations are 1.459c. to 1.509c., Philadelphia, for No. 10 blue annealed.

Billets.—Specifications show more life and are described as somewhat better than fair. The quotation is unchanged at $21.52, Philadelphia, for open-hearth rolling billets, with forging steel commanding an extra of about $4. A local producer has sold 1000 tons for export to England at a figure slightly better than the quotation for domestic delivery.

Coke.—An eastern Pennsylvania steel company is reported to have closed for 10,000 tons of Connellsville furnace coke for April delivery at $1.65 at oven. Both furnace and foundry coke show but little activity and, of the two, foundry is the quieter. Quotations for prompt delivery Connellsville furnace coke are $1.50 to $1.65 per net ton at oven. Contract furnace to the end of the year is quoted at $1.75. Prompt foundry ranges from $2 to $2.50. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—Heavy melting steel again shows weakness, and while some dealers are asking over $11 per ton it would be difficult at this time to get more than that figure. Not much interest is shown in any direction. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$11.00 to $11.25
Old steel rails, rerolling	11.00 to 11.50
Low phos. heavy melting steel scrap	14.25 to 14.50
Old steel axles	14.00 to 14.50
Old iron axles	17.50 to 18.00
Old iron rails	13.00 to 14.00
Old carwheels	11.00 to 11.50
No. 1 railroad wrought	12.50 to 13.00
Wrought-iron pipe	10.00 to 10.50
No. 1 forge fire	8.00 to 8.50
Bundled sheets	9.00 to 9.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	8.25 to 8.75
Cast borings	8.00 to 8.50
No. 1 cast	11.75 to 12.25
Grate bars, railroad	8.75 to 9.25
Stove plate	8.75 to 9.25
Railroad malleable	9.00 to 9.50

Cleveland

CLEVELAND, OHIO, April 6, 1915.

Iron Ore.—A few small cargoes of ore for early shipment have been sold to furnaces which want certain grades for their mixtures, but the price was not named; the buyers agreed to pay whatever is established later as the market price. Generally consumers are as yet taking no interest in the market. The season of navigation opens next week, but leading shippers are in no hurry to get their boats started and little ore will be moved during the first few weeks of the season. Dock shipments have improved somewhat. We repeat 1914 prices as follows: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3.00; Mesaba non-Bessemer, $2.85.

Pig Iron.—Consumers of foundry iron in this territory are showing no interest in the market and may not cover for their last half requirements for some time. The recent low Buffalo prices have not resulted in stirring up any activity here. Buyers apparently feel that prices will go no higher in the near future and will take their time in placing contracts. The market is not firm. Foundry iron is reported to have been offered at $13, delivered Cleveland, for No. 2, although $13.25 is the bottom open quotation. For outside shipment $12.75 at furnace can probably be shaded. Valley iron for Cleveland delivery can be bought at $12.50 furnace for No. 2. A moderate volume of business in Southern iron is coming out, a number of small sales in lots of 500 tons and under having been made at $9.50, Birmingham, for No. 2 for the last half and $9.25 for spot shipment. We quote delivered, Cleveland, as follows:

Bessemer	$14.55
Basic	13.45
Northern No. 2 foundry	$13.25 to 13.50
Southern No. 2 foundry	13.50 to 13.75
Gray forge	13.00
Jackson Co. silvery 8 per cent. silicon	16.37 to 16.62
Standard low phos. at furnace	19.75 to 20.00

Coke.—A Cleveland consumer has bought about 1000 tons of Connellsville coke for delivery over twelve months at $2.40. Some spot shipment foundry coke is moving but there is no buying for the last half. We quote standard Connellsville furnace coke at $1.50 to $1.60 per net ton at oven for spot shipment and the best makes of Connellsville foundry coke at $2.25 to $2.50.

Finished Iron and Steel.—Specifications on contracts are coming out in good volume and some new business in steel bars and structural material is being placed at the 1.20c., Pittsburgh, price, which is apparently being firmly maintained. While the leading makers are holding to the 1.20c., Pittsburgh price for plates, the market in this territory is about 1.15c. and this price is being shaded $1 a ton for the lighter gauges, at least. The demand for plates shows a material improvement, this being largely due to a large amount of oil tank work that has come out recently. There is also some improvement in the demand from boiler makers. The Otis Steel Company is at present operating its Lakeside plant at full capacity. The Cleveland buyer who had an order for about 100,000 tons of steel bars for export to France, decided to divide this order between two mills. The one for 46,000 metric tons was placed and a formal contract for the other half will probably be signed within a few days. While 30,000 tons additional are pending it is probable that other round lot orders will come from the same source. Structural specifications are good but not much new work is coming out. The McClintic-Marshall Company has taken 1500 tons for the new plant of the Warren City Tank & Boiler Company, Warren, Ohio. We note the sale of 1000 tons of sheet bars at $20, Youngstown, for April delivery. Black and blue annealed sheets are in good demand and prices are being well maintained at 1.80c., Ohio mills, for No. 28 black; 3.40c. for No. 28 galvanized and 1.30c. to 1.35c. for No. 10 blue annealed. The Toledo Railway & Light Company has an inquiry out for 500 tons of rails. Bar iron is in light demand and both local mills are shut down. We quote iron bars at 1.20c. to 1.25c., Cleveland, for local delivery. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—Specifications for bolts and nuts are fairly good and some contracts are being placed for the second quarter. Prices are firm, the recent advances being well maintained. Some of the rivet consumers did not specify to the full amount of their first quarter contracts and these contracts are being extended through the second quarter. These contracts were made on the basis of 1.45c. Pittsburgh for structural and 1.55c. for boiler rivets, which is the current market price. However, these prices are being shaded by some dealers for prompt shipment. Bolt and nut discounts are as follows: Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 80 and 15 per cent.; cut thread, 80 and 10 per cent.; larger or longer, 75 and 17½ per cent.; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 80 and 2½ per cent.; coach and lag screws, 85 and 2½ per cent.; square h.p. nuts, blank or tapped, $6.40 off; hexagon h.p. nuts, blank or tapped, $7.30 off; c.p.c. and t. square nuts, blank or tapped, $6.10 off; hexagon, ⅝ in. and larger, $7.60 off; 9/16 and smaller, $8.30 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10, 10 and 5 per cent.; 9/16 and smaller, 85, 10, 10, 10 and 5 per cent.

Old Material.—The local mills are well supplied with material and there is practically no buying. Youngstown consumers are entirely out of the market. Prices are weak and quotations have been lowered about 25c. a ton on several grades. The supply appears to be much larger than the demand. Yard dealers have large stocks on hand. There is a large surplus of steel car axles, the demand for which has been unusually light recently. The Lake Shore division of the New York Central Lines will receive bids Thursday for a large tonnage. We quote f.o.b. Cleveland as follows:

Per Gross Ton

Old steel rails, rerolling	$11.00 to $11.75
Old iron rails	12.00
Steel car axles	12.00 to 12.50
Heavy melting steel	10.00 to 10.25
Old carwheels	9.75 to 10.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	10.00 to 10.25
Steel axle turnings	8.75 to 9.00
Light bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron car axles	$15.50 to $15.75
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.50 to 5.75
No. 1 busheling new	8.50 to 8.75
No. 1 busheling old	8.25 to 8.50
No. 1 railroad wrought	9.50 to 9.75
No. 1 cast	9.75 to 10.25
Stove plate	8.00 to 8.25

M. E. Lazurus has severed his connections with the Fertel Company, scrap-iron dealer, Cleveland, with which he has been associated for the past 10 years and is now engaged in the scrap-iron business under the name of the M. E. Lazurus Company, 824 Rockefeller Building, Cleveland.

Cincinnati

CINCINNATI, OHIO, April 7, 1915.—(*By Wire.*)

Pig Iron.—Southern furnaces are feeling more confident as to their ability to maintain a minimum price of $9.50, Birmingham basis, which is now the general quotation. Rumors have been circulated that there is yet a considerable quantity of resale iron to be had below this figure, but careful inquiry proves that this is not correct. The amount of Southern No. 2 foundry iron for spot shipment that is obtainable at $9.25, Birmingham, is still a factor to be considered, but the conditions governing sales contracts have not proved satisfactory to customers. A local inquiry calls for 1000 tons of foundry iron that will probably be bought from both Southern and Northern furnaces. There are two inquiries from Indiana for approximately 500 tons each of Southern iron for last half shipment. Michigan melters are also feeling the market and one foundry placed an order for 600 tons of Southern foundry iron for last half. An Ohio melter has closed for 500 tons for May and June delivery. A Michigan manufacturer is asking for 1500 tons of Northern foundry iron to be shipped to a plant in St. Louis territory. Hanging Rock producers are holding firm at $12.75, Ironton, for either prompt or last half shipment, although this has been shaded on a few desirable prompt shipment contracts. A sale of approximately 500 tons of Lake Superior charcoal iron was made to an Ohio melter last week at current market quotations. It is reported that a round tonnage of Southern foundry iron has been bought by a Central Western foundry with shipments extending throughout the year. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$12.65 to $13.15
Southern coke, No. 2 f'dry and 2 soft.	12.15 to 12.65
Southern coke, No. 3 foundry	11.65 to 12.15
Southern No. 4 foundry	11.15 to 11.65
Southern gray forge	10.65 to 11.15
Ohio silvery, 8 per cent. silicon	16.01 to 16.26
Southern Ohio coke, No. 1	15.01 to 15.51
Southern Ohio coke, No. 2	14.01 to 14.51
Southern Ohio coke, No. 3	13.76 to 14.01
Southern Ohio malleable Bessemer	14.26
Basic, Northern	14.26
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—A six months' supply of 48-hr. coke is reported as sold to a Virginia furnace by a Pocahontas producer, the amount being about 30,000 tons. Neither furnace nor foundry coke is in demand in this territory, and the only new business is for a few carloads of foundry coke that are ordered to fill in. Shipments on contracts for both furnace and foundry coke are now fairly satisfactory, with a steady improvement in specifications noted from foundry sources. We quote Connellsville furnace coke at $1.50 to $1.60 per net ton at oven, for prompt shipment, with contract figures ranging from $1.60 to $1.75. Connellsville foundry coke ranges from $2 to $2.50 for either prompt or forward shipment, although the average contract price is about $2.30. Pocahontas and Wise County operators are asking 10c. to 20c. more than the prices above named.

Finished Material.—A manufacturer at Dayton, Ohio, has placed orders for approximately 6000 tons of round steel bars that will be used to fill an urgent order for special forgings. It is understood that this material will be used for making shrapnel cases in the rough, and that the contract calls for the weekly delivery of 250 tons of the semi-finished product. It is also reported that other manufacturers in Dayton have been endeavoring to aid in filling the entire contract in their own city so that the shells would go forward to consignees practically ready to be charged. There is a better call for structural material on old contracts, including reinforcing concrete bars. The advancing of mill prices to 1.20c., Pittsburgh, on structural shapes and steel bars has not had any effect on buying in this territory. Jobbers and contractors are generally well covered for several weeks ahead. However, when the smaller customers come into the market a much livelier movement is expected in all finished material lines. We quote steel bars and small structural shapes from local warehouse stocks at 1.80c. There is a very light demand for railroad track material. Hoops and bands are also quiet, but there is an improvement noted in the call for both galvanized and black sheets for prompt shipment.

Old Material.—The records for the month of March show that a comparatively large tonnage of scrap changed hands. Prices, however, were at a low mark. There has been no improvement this month, but on several grades there is a decided weakness. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton	
Bundled sheet scrap	$6.25 to $6.75
Old iron rails	10.50 to 11.50
Relaying rails, 50 lb. and up	19.25 to 19.75
Rerolling steel rails	9.75 to 10.25
Melting steel rails	8.50 to 9.00
Heavy melting steel scrap	8.50 to 9.00
Per Net Ton	
No. 1 railroad wrought	$8.50 to $9.00
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.00
Railroad cast scrap	9.00 to 9.50
No. 1 machinery cast scrap	10.25 to 10.75
Burnt scrap	6.50 to 7.00
Old iron axles	13.50 to 14.00
Locomotive tires (smooth inside)	8.50 to 9.00
Pipes and flues	5.75 to 6.25
Malleable and steel scrap	7.00 to 7.50
Railroad tank and sheet scrap	5.00 to 5.50

Buffalo

BUFFALO, N. Y., April 6, 1915.

Pig Iron.—Most producers report only a moderate total of inquiry and sales, following the heavy selling of the week previous. One interest, however, states it has had inquiry from a number of large users, both of foundry grades and malleable, aggregating over 60,000 tons, and this in spite of the announced rise in price. It is intimated that $13 was quoted for prompt delivery, third quarter and remainder of year. The range of prices for the week has been $12.50 to $13.50 furnace for third quarter and last half delivery, with a majority of the furnace interests holding to a minimum of $13 for any grade. While it is known that some iron has been quoted in the past week by one interest at $12.50, at furnace, that price is now disappearing as producers appear to be fully sold up for second quarter delivery. Reports indicate that the total purchase by the American Radiator Company in the recent selling movement was 20,000 to 25,000 tons, foundry grades.

Finished Iron and Steel.—Specifications and inquiries continue in fair quantity for most all finished products, with an increase in inquiries for structural material. It develops that some fabricators have not covered for a sufficient quantity of plain material to meet second-quarter requirements, and they are now obliged to buy at an advanced price. So far as can be learned, 1.20c. Pittsburgh base, is being firmly held for bars, plates and shapes for prompt specification and remainder of second quarter. The Lackawanna Steel Company has received contracts for approximately 70,000 tons of large rounds for export, 20,000 tons of the amount going to Canada. It is said that a portion of the order at least will be rolled in the company's rail mills. The Lackawanna Company also has 9000 tons of the steel rail order recently distributed by the Erie Railroad. The Turner Construction Company will erect a warehouse and factory for W. H. Walker & Co., Buffalo, requiring 350 tons of reinforcing bars and a considerable tonnage of structural steel. The Turner Company has also the contract for a factory for the Buffalo Meter Company, which also takes 350 tons of reinforcing bars and some structural steel.

Old Material.—Considerable business is being done and the market remains active except for turnings and borings. Consumers of these two commodities appear to have covered needs for the time being and the prices have fallen off slightly, although not sufficiently to make any quotable change in the schedule. The continued activity reported in pig iron inquiry influences some dealers to believe that scrap prices are bound to be

favorably affected in the near future. We continue last week's schedule, quoting dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$10.50 to $10.75
Low phosphorus steel	13.00 to 13.50
No. 1 railroad wrought scrap	10.00 to 10.50
No. 1 railroad and machinery cast	10.50 to 11.00
Old steel axles	12.00 to 12.50
Old iron axles	16.00 to 16.50
Old carwheels	10.50 to 11.00
Railroad malleable	9.50 to 10.00
Machine shop turnings	5.75 to 6.25
Heavy axle turnings	8.50 to 9.00
Clean cast borings	6.50 to 7.00
Old iron rails	11.00 to 11.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.25 to 8.75
Wrought pipe	6.50 to 7.00
Bundled sheet scrap	7.25 to 7.75
No. 1 busheling scrap	8.50 to 9.00
No. 2 busheling scrap	6.00 to 6.50
Bundled tin scrap	9.00

St. Louis

ST. LOUIS, MO., April 5, 1915.

Pig Iron.—The only inquiry of size is one for 600 tons of Lake Superior charcoal iron to be closed this week. While it is generally conceded that No. 2 Southern iron is to be had at $9.25, Birmingham basis, at some points, representatives here declare that neither have they authority to quote below $9.75 nor have they succeeded in getting through any $9.25 transactions.

Coke.—Transactions are in carload lots. By-product coke is maintained at about $5.20 per net ton delivered, St. Louis.

Finished Iron and Steel.—The new 1.20c. Pittsburgh basis has been well accepted by purchasers. Representatives state that the March business showed considerable improvement over February and that the movement upward in volume has continued since the first of the month. The buying is mainly against contracts. Agricultural implement and vehicle interests are buying more freely also and improvement in the cotton section is attracting attention. Out of warehouse the movement continues good. For stock out of warehouse we quote as follows: Soft steel bars, 1.70c.; iron bars, 1.65c.; tank plates, 1.80c.; structural material, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, 2.55c.; No. 28 galvanized sheets, black sheet gauge, 3.65c. to 3.75c.

Old Material.—The dumping of material by the railroads in the new lists just out has had a depressing effect and the quotations given are subject to further revision, though they represent the market at this point at the time of writing. Indeed lower prices may be expected before the end of the week. The list out includes 12,000 tons from the Baltimore & Ohio, 500 tons from the Vandalia, 1200 from the Missouri Pacific and 2300 from the Wabash. Relaying rails are in good demand and the supply very light. We quote dealers' prices f.o.b. St. Louis, as follows:

Per Gross Ton

Old iron rails	$10.50 to $10.75
Old steel rails, rerolling	10.25 to 10.50
Old steel rails, less than 3 ft.	11.50 to 12.00
Relaying rails, standard, section, subject to inspection	21.00 to 23.00
Old carwheels	10.25 to 10.50
No. 1 railroad heavy melting steel scrap	9.50 to 9.75
Shoveling steel	8.75 to 9.00
Frogs, switches and guards cut apart	9.50 to 9.75
Bundled sheet scrap	6.00 to 6.25

Per Net Ton

Iron angle bars	$10.75 to $11.00
Steel angle bars	8.50 to 8.75
Iron car axles	14.50 to 15.00
Steel car axles	10.75 to 11.00
Wrought arch bars and transoms	11.25 to 11.50
No. 1 railroad wrought	8.25 to 8.50
No. 2 railroad wrought	8.00 to 8.25
Railroad springs	8.50 to 8.75
Steel couplers and knuckles	8.50 to 8.75
Locomotive tires, 42 in. and over, smooth inside	9.00 to 9.25
No. 1 dealers' forge	7.50 to 7.75
Mixed borings	5.25 to 5.50
No. 1 busheling	7.50 to 7.75
No. 1 boilers, cut to sheets and rings	6.25 to 6.50
No. 1 railroad cast scrap	9.50 to 10.00
Stove plate and light cast scrap	8.00 to 8.25
Railroad malleable	6.25 to 6.50
Agricultural malleable	6.00 to 6.25
Pipes and flues	6.25 to 6.50
Railroad sheet and tank scrap	6.00 to 6.25
Railroad grate bars	7.50 to 7.75
Machine shop turnings	5.50 to 5.75

Birmingham

BIRMINGHAM, ALA., April 5, 1915.

Pig Iron.—While a sizeable tonnage of pig iron was bought by pipe makers in March, the report of the sale of 40,000 tons the past week cannot be verified. On Monday, March 29, an offer of $9.25 for a round tonnage was declined by one of the principal makers. It is believed in some quarters that the pipe makers have probably picked up a considerable tonnage of machine cast iron. Local producers feel better since March has gone and it is shown that there has been a reduction in makers' stocks of 50,000 to 60,000 tons. One interest alone reduced its stocks 30,000 tons. This has been the largest month's decrease of accumulated metal since the high point of 450,000 tons was reached. The total is now about 350,000 tons. The outgo continues to be large, and the reduction will continue without break. March sales have probably averaged a fair volume. One maker reports sales of more than output and two others sales of 15,000 tons each. Recent business has involved both basic and foundry, but manufacturers are not going into details as to particular orders. The persistent effort to hammer the general Birmingham market to $9.25 is pronounced unsuccessful on all sides. A large tonnage for cash or to especially good customers, it is believed, might be secured on that basis, but general business is still done, they all insist, on the basis of $9.50, with small lots at $9.75. The output is still restricted. Foreign inquiry is firm. We quote, per gross ton, f.o.b. Birmingham furnaces, as follows:

No. 1 foundry and soft	$10.00 to $10.25
No. 2 foundry and soft	9.50 to 9.75
No. 3 foundry	9.00 to 9.25
No. 4 foundry	8.75 to 9.00
Gray forge	8.50 to 8.75
Basic	9.50 to 10.00
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—Orders have not been coming in with regularity recently, but the output is still about 70 per cent. of capacity and is moved as rapidly as manufactured, so far as water pipe is concerned. The sanitary pipe factories report a listless market, owing to inactivity in the building trades, and operations are on a very much reduced scale. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $20; 6-in. and upward, $18, with $1 added for gas pipe.

Coal and Coke.—The coal market has held its own better than was expected, the prolongation of cold weather having helped the domestic mines considerably. The quantity of domestic coal consumed in the South the past winter is said to have been the greatest on record. The coke market is inactive. It is understood that by-product coke is making continuous inroads on the beehive in foundry uses. The Alabama by-product make now is probably 70 per cent. of the total. Thomas A. Edison, Inc., Orange, N. J., has begun the building of a 2000-gal. per day benzol plant adjacent to the Koppers ovens of the Woodward Iron Company. The latter company will sell the gas but have no other interest in the Edison plant. We quote, per net ton, f.o.b. oven, as follows: Furnace, $2.60 to $2.90; foundry, $3.20 to $3.50.

Old Material.—The scrap market has had a listless week, except that some of the lighter steel grades have been moving in fair volume. Dealers are cautious in filling yards. Nominal prices have not changed, but all sorts of special deals are made. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.00 to 12.50
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.00 to 7.50
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	8.50 to 9.00
Stove plate	8.00 to 8.50

The Canadian Drydock & Shipbuilding Company, Owen Sound, Ont., announces that it has made the necessary financial arrangements for constructing its proposed plant. It is estimated that $2,000,000 will be expended on docks and machine shop.

San Francisco

SAN FRANCISCO, CAL., March 30, 1915.

Evidence is visible of a seasonable revival in consuming lines. Small activities are being resumed through the country, and the reopening of mills and logging camps, etc., is accompanied by more inquiries for miscellaneous supplies, including a fair tonnage of light rails. Exposition traffic and the prospect of large crops have caused more activity in the railroad shops. Merchants and manufacturers, however, are limiting purchases rather closely to nearby requirements.

Bars.—Distributive trade shows a little healthier tone, but can hardly be considered active. Specifications are a little better, but not much new business is being closed, buyers showing no disposition to place contracts for second-quarter delivery at the ruling prices. Nothing requiring any large tonnage of reinforcing steel has appeared of late, though small orders are somewhat more numerous.

Structural Material.—The Central Iron Works has taken a contract for an eight-story building for the Pacific Gas & Electric Company, in this city. Plans are out for a Christian Science Church in Oakland, requiring less than 100 tons, and a Y. W. C. A. building at San Jose, Cal., about 150 tons. The amount of work in more or less definite prospect is increasing, and plans are expected within a few weeks for a number of schools and public buildings, including several for the University of California.

Plates.—While little new business has been done, specifications are coming out well on old contracts for tank and marine material. Jobbing trade with the small boiler shops, etc., shows a little more life, but is not active, and merchants are merely keeping their stocks sorted up.

Sheets.—Galvanized sheets are still firmly held at the basis of 3.40c., Pittsburgh, but buyers are taking less interest. The tonnage booked at lower prices has been practically all specified, and there seems to be little desire among sellers to make contracts for second quarter. Consuming requirements are increasing somewhat, but have been light for the last few months, and the trade is fairly well supplied. Blue annealed and hard red sheets are beginning to receive more attention, but the movement is not large as yet.

Wrought Pipe.—Requirements of the plumbing supply trade in the larger cities continue light. Jobbing trade in the country, however, is gradually picking up, and a few good-sized waterworks inquiries for pipe, fittings and valves are appearing, the city of Portland, Ore., having placed an order for about 100 tons of 2-in. pipe. Merchants are buying only for nearby needs. Oil-field business is dull, and conditions there are not encouraging. The Union Oil Company is taking up its pipe line on the Isthmus of Panama, laid 10 years ago, and will use it in its California system.

Cast-Iron Pipe.—Municipal business continues to come out fairly well, and while corporation business has been quiet there appears to be some activity in gas development in small towns of northern California and the north coast. The city of Los Angeles is taking bids this week for 200 tons and Santa Cruz for 60 tons, while Pasadena has received figures on about 400 tons. Figures for the Sacramento waterworks will be received April 20, but bidders have not yet received the specifications. The city of Oakland is planning another extension of the high-pressure fire protection system, requiring a lot of 10 and 12-in. pipe.

Pig Iron.—Foundry trade is picking up a little at outside points, and to some extent locally, leading to a few scattered purchases of pig iron, though not enough to make much impression on the supply held here. The larger foundries are still pretty well supplied, and there is little stability to prices.

Coke.—While a few good sized purchases of both foreign and domestic coke are said to have been made by outside interests, there is no movement of any consequence to the foundry trade, and a heavy tonnage of foundry coke is still held by importers. The immediate outlook for further importations is not very favorable, however, and prices are steadily maintained at about $12.50 per net ton for prompt delivery and $11 to $12 per gross ton, to arrive.

Old Material.—The scrap market continues in poor shape. There is some demand for cast-iron scrap, but the movement is limited, prices remaining at the old range of $14 to $16 per net ton. Holders of steel scrap ask about $8 per gross ton for small lots, but there is no established price on large quantities, as the larger melters are liberally supplied and their requirements at present are small.

Boston

BOSTON, MASS., April 6, 1915.

The scrap market has changed very little. Brokers are a little more active, perhaps, but nothing has occurred to alter prices. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	$8.25to	$8.50
Low phosphorus steel	13.75 to	14.75
Old steel axles	12.75 to	13.25
Old iron axles	20.25 to	20.75
Mixed shafting	12.00 to	12.25
No. 1 steel wrought and soft steel	8.25 to	8.75
Skeleton (bundled)	5.50 to	5.75
Wrought-iron pipe	7.00 to	7.50
Cotton ties (bundled)	5.25 to	5.75
No. 2 light	3.25 to	3.75
Wrought turnings	5.00 to	5.50
Cast borings	5.00 to	5.25
Malleable	7.50 to	7.75
Stove plate	7.00 to	7.50
Grate bars	5.25 to	5.50
Machinery cast (price to consumers)	11.25 to	11.50

New York

NEW YORK, April 7, 1915.

Pig Iron.—A few buyers whose requirements are considerable have been looking about in the past week for Buffalo iron at the prices made in the recent movement in that district. Most Buffalo furnaces, however, are now quoting $13 for No. 2 X at furnace and for higher silicon iron, $13.25 to $13.50 for delivery either in the second quarter or second half. The International Steam Pump Company is in the market for 2450 tons of various grades, and a manufacturer of sanitary pipe is negotiating for a considerable amount of Southern iron. A large radiator interest is understood to have contracted for the proportion of Southern iron it usually buys, and one or two cast-iron pipe companies have bought Southern iron, the amount being variously estimated at 50,000 to 75,000 tons. In eastern Pennsylvania the basic situation is interesting. One considerable inquiry has come up, and while furnaces have recently been talking $13.75 to $14, delivered, it is understood that the inquiry referred to has brought out a price below $13.50. General foundry buying is not heavy, though Buffalo interests have made a number of sales in the past week at prices ruling one week ago, which were based on $12.50 for No. 2 X. We quote as follows at tidewater: No. 1 foundry, $14.25 to $14.50; No. 2 X, $14 to $14.25; No. 2 plain, $13.75 to $14; Southern iron, $14.50 for No. 1 and $14 to $14.25 for No. 2.

Ferroalloys.—Definite assurances from British producers of ferromanganese that their New York representatives are to receive shipments this month are generally reported. Some cables have named the vessels on which the alloy is loaded. It is estimated that about 10,000 tons will be received in this allotment, it being acknowledged that the present arrangements apply only to the immediate future. Whether more will come later evidently depends on the success of this shipment and political and economic developments.

It is acknowledged that all the alloy that is now to come will pass through the hands of a large New York firm of accountants who are to secure a bond from each consumer guaranteeing that none of the manganese nor any steel made from it is either to be re-exported or sold to another for re-export to any enemy of the allies or to any other foreign consumer without Great Britain's knowledge and consent. It is expected that practically all of the incoming alloy will be delivered on the recently merged contracts. The quotation still remains at $78, seaboard, with some new contracts placed for filling when enough of the alloy is available. Spiegeleisen is fairly active at about $26 at furnace. Further good business in 50 per cent. ferrosilicon, both for domestic and foreign delivery, continues to be reported, quotations still ranging from $71 to $73, Pittsburgh.

Structural Material.—A survey shows that there has been a gradual improvement in the past two months and reports at this time are unanimous that the structural market continues on the uptrend. April so far has given little sign of price strength in plain material, however, for the 1.10c. Pittsburgh price has not yet disappeared. Architects' offices have numerous good size building projects awaiting financing, and this is the main encouragement. The largest and about the only fresh proposal comprises 1000 tons for the Eagle Pencil Company, East Thirteenth street, but against this is to be noted the following contract awards: 1600 tons for the Astor office building, Broadway and Vesey street, to the American Bridge Company; 200 tons for the Reid Ice Cream Company, Brooklyn, to the National Bridge Company; 350 tons for a copper smelter, Tottenville, S. I., to the McClintic-Marshall Company; 300 tons for University Hall, Columbia University, to the Hinkle Iron Company, and 400 tons for the Palmer apartment house, West Seventy-sixth street, to the Harris H. Uris Iron Works. We quote mill shipments at 1.10c. to 1.20c., Pittsburgh, or 1.269c. to 1.369c., New York, and from store, 1.85c. to 1.90c., New York.

Plates.—Buyers are taking kindly to an advance and considerable new business has been taken at 1.15c., Pittsburgh, though 1.10c. is still quoted. Wide plates are in better demand, while universal plate mills have not much work ahead of them. Export inquiry is good and includes in one case 2500 tons of plates for France from 3/16 to 1 in. in thickness. The Bull Steamship Company has placed its second steamship with the Maryland Steel Company. The railroad car situation is, if anything, worse than ever. Aside from the 1000 cars for the International & Great Northern, there are less than 50 passenger equipment cars under consideration. The Pressed Steel Car Company is to build 15 cars of the passenger equipment classification for the New York, Westchester & Boston, and the American Car & Foundry Company has been awarded six coaches for the Richmond, Fredericksburg & Potomac. We quote steel plates at 1.10c. to 1.20c., Pittsburgh, or 1.269c. to 1.369c., New York, and from store, 1.85c. to 1.90c., New York.

Iron and Steel Bars.—Mill activity is confined to specifications on contracts and to foreign orders, as practically no business has so far developed in April. Some mills are adhering closely to 1.20c., Pittsburgh, on new inquiry, though in a few cases buyers are given the advantage of the freight differential where the mill is located outside of Pittsburgh. It is claimed that a fairly attractive offering could be closed at 1.10c., Pittsburgh. Foreign inquiry for track accessories is noted from Spain. We quote mill shipments of steel bars at 1.15c. to 1.20c., Pittsburgh, or 1.319c. to 1.369c., New York, and refined iron bars 1.20c. to 1.25c., New York. Out of store in New York we quote iron and steel bars at 1.80c. to 1.85c.

Cast-Iron Pipe.—New municipal lettings are few and only call for small quantities. An inquiry from Argentina is in the market for about 450 tons of 12-in. The demand from private buyers continues excellent, but competition for such business is still keen and prices are close. Carload lots of water pipe, Class B and heavier, are quoted at $21 to $21.50 per net ton, tidewater, for 6-in., with Class A and gas pipe quoted at $1 per ton more.

Old Material.—Some of the most important steel companies in eastern Pennsylvania are refusing to receive more steel scrap for the present, having a sufficient stock on hand. A few of the others are taking in shipments, but are not purchasing freely. Notwithstanding this condition among consumers, and in face of the fact that railroad lists now out are offering good quantities, prices are well held and choice material commands a slightly better figure in this market than last week. Relaying rails are in considerably less demand than in the latter part of March, but, on the other hand, the supply coming from railroads is not large, as little laying of new rails is being done at this time, so that prices are maintained. Rolling mills are doing very little, and prices of wrought scrap can hardly be considered firm. Brokers' quotations to local dealers and producers, per gross ton, New York, are as follows:

Old girder and T rails for melting	$8.50 to $9.00
Heavy melting steel scrap	8.50 to 9.00
Relaying rails	19.00 to 19.50
Rerolling rails (nominal)	8.75 to 9.25
Iron car axles (nominal)	15.25 to 15.75
Steel car axles (nominal)	11.75 to 12.25
No. 1 railroad wrought	10.25 to 10.75
Wrought-iron track scrap	9.50 to 9.75
No. 1, yard wrought, long	9.50 to 9.75
No. 1, yard wrought, short	8.50 to 8.75
Light iron	3.25 to 3.75
Cast borings	6.00 to 6.25
Wrought turnings	6.25 to 6.50
Wrought pipe	7.75 to 8.00

Foundries are adhering to their policy of purchasing in small quantities, but the demand from this source is quite steady. Old carwheels are considerably lower, because of increasing quantities offered and no improvement in the demand from consumers. Quotations to consumers on cast scrap are as follows, per gross ton, New York:

Carwheels	$8.75 to $9.00
No. 1 heavy cast, broken up	11.00 to 11.25
Stove plate	8.00 to 8.25
Locomotive grate bars	7.50 to 8.00
Malleable cast (railroad)	8.00 to 8.25

British Market Higher

Production Costs Advancing—Wages Increasing and Government Control of Plants Growing

(By Cable)

LONDON, ENGLAND, April 7, 1915.

Speculative interest continues. Costs are increasing and much higher prices are eventually anticipated. Wages in Cumberland have advanced 22½ per cent. Labor has lost much time and Government control of works is extending. Furnaces in blast are 165 against 171 a year ago. Stocks in Connal's stores were 129,181 tons at the close of last week, against 128,262 tons one week previous. American billets have sold at 130s. ($31.63), c.i.f. Liverpool. Quotations are as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 16s. 9d. ($4.07).

Cleveland pig-iron warrants, 68s. 11d. ($16.77), compared with 67s. to 68s. ($16.30 to $16.55) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 69s. ($16.79), against 67s. ($16.30) a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £10 10s. ($51.09).

Steel ship plates, Scotch, delivered local yards, £9 10s. ($46.22).

Steel rails, export, f.o.b. works port, £7 10s. ($36.50), against £7 5s. ($35.28) a week ago.

Hematite pig iron, f.o.b. Tees, 105s. ($25.55), against 100s. ($24.33) last week.

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 ($34.06).

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £9 ($43.79).

Steel bars, export, f.o.b. Clyde, £9 10s. ($46.22).

Ferromanganese, f.o.b., £15 10s. ($75.42).

Metal Market

NEW YORK, April 7, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Mar.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
31	17.00	15.87½	49.75	4.15	4.12½	9.50	9.25
April							
1	17.00	15.87½	47.90	4.20	4.12½	9.50	9.25
2	17.00	15.87½	47.87½	4.20	4.12½	9.50	9.25
3	17.00	15.87½	48.00	4.20	4.12½	9.50	9.25
5	17.00	15.87½	47.87½	4.20	4.12½	9.50	9.25
6	17.25	15.87½	47.25	4.20	4.12½	9.62½	9.37½

Copper is higher, principally because of foreign demand. Tin is quiet and lower despite the scarcity of spot metal. Lead is in great demand abroad and higher. Spelter is firmer. English brands of antimony are practically unobtainable; Chinese is strong.

New York

Copper.—The demand from abroad was heavy last week, while that from domestic consumers was good, a combination which caused the quotation for electrolytic to advance to 15.87½c., cash, New York. The foreign buying was the chief feature. At the present time the market is quieter, especially as regards electrolytic. Late yesterday there was some heavy buying of Lake at 17.25c., all of which is to be used in the manufacture here of war materials but ultimately for export. More buying of the same sort and on the part of the same interest is expected. Of course, less favored brands can be had under the price named. The exports in March totaled 29,845 tons.

Copper Averages.—The average price of Lake copper for the month of March, based on daily quotations in *The Iron Age*, was 15.75c., and of electrolytic, 15.01c.

Tin.—Since the last report the market has been quiet at all times, with business confined to small lots of spot. The scarcity of spot or nearby metal is unrelieved and it is almost impossible to obtain 25 tons in one lot. Relief is promised late this month, however, in view of the quantity of Banca tin now afloat en route to this port. It is estimated to be about 1300 tons, coming direct from the Far East. In addition, the steamer Philadelphian is about due with 285 tons from London. All told, the estimated quantity afloat is 5110 tons. Shipments from London continue to be made with great difficulty and subject to long delays because of the manner in which the British Government has taken both lighters and ships for war purposes, while there are labor troubles as well. The March deliveries were given last week. The total of deliveries for three months, 8875 tons, was 2475 tons less than in the same time last year. The total visible supply March 31, 1915, was 15,467 tons, as compared with 16,989 tons on the same date a year ago. The New York quotation yesterday was 47.25c.

Lead.—It is estimated that the export inquiries received here last week totaled 20,000 tons. The domestic consumption is not heavy, but influenced by the foreign requirements the market has a strong tone. The influence referred to caused the large interest to advance its price $1 a ton April 1, and 4.20c., New York, is now quoted. The St. Louis quotation is 4.12½c. On foreign shipments a premium of at least $2 per ton is exacted. The exports in March totaled 4540 tons.

Spelter.—The heavy foreign demand continues, but the domestic market is not particularly active. In March there was exported 6552 tons. Prime Western spelter for domestic delivery is quoted at about 9.62½c., New York, and 9.37½c., St. Louis. Brass mill special is nominal at about 13c., while choice brands, such as Bertha and Horsehead, are quoted up to 20c. per lb.

Antimony.—The quotation for Cookson's and Hallett's are given as 35c. and 32c., respectively, but these prices are entirely nominal except in cases where a few stray casks may be uncovered. Chinese has been sold at prices ranging from 21c. to 22c. The shot which are placed in the cases of shrapnel shells contain 10 to 12 per cent. of antimony which renders them harder than they would be if made of lead alone.

Old Metals.—Dealers report a continued good demand with selling quotations unchanged, as follows:

	Cents per lb.
Copper, heavy and crucible	14.00 to 14.25
Copper, heavy and wire	13.75 to 14.00
Copper, light and bottoms	12.50 to 12.75
Brass, heavy	9.50 to 9.75
Brass, light	7.75 to 8.00
Heavy machine composition	11.50 to 11.75
Clean brass turnings	9.50 to 9.75
Composition turnings	9.75 to 10.25
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	6.50

Chicago

APRIL 5.—The situation in copper is this week more clearly defined and there is less of a spread in prices, the firmness in the market being established. Tin is lower, despite the scarcity of importations immediately in sight. The situation in other metals is practically unchanged. We quote as follows: Casting copper, 15.25c. to 15.50c.; Lake copper, 16.25c. to 16.50c., for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 50c.; small lots, 52c.; lead, desilverized, 4.15c., and corroding, 4.40c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, nominally, 9.50c. to 9.75c.; sheet zinc, 13.50c., price for immediate acceptance; Cookson's antimony, 30c., for cask lots; other grades, 23c. to 24c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12.25c.; copper bottoms, 10.75c.; copper clips, 12c.; red brass, 10.75c.; yellow brass, 8.75c.; lead pipe, 3.50c.; zinc, 7.25c.; pewter, No. 1, 25c.; tinfoil, 35c.; block tin pipe, 39c.

St. Louis

APRIL 5.—Non-ferrous metals are still firm and tending higher in this market, but with sales checked by the high prices. Lead is quoted at 4.12½c. to 4.17½c.; spelter, 10c.; tin, 50c.; Lake copper, 16c.; electrolytic copper, 15.90c.; Cookson's antimony, 28c. In the Joplin ore market there was a firmer tendency with 60 per cent. zinc blende $48 to $60 per ton and the top settlement at $63; calamine, $31 to $33 for 40 per cent. and the best settlement $40. Lead ore was firmer with 80 per cent. galena selling at $51, an advance of $1. Miscellaneous scrap metals are quoted as follows: Light brass, 6c.; heavy yellow brass, 7.50c.; heavy red brass and light copper, 9.50c.; heavy copper and coper wire, 11c.; zinc, 5c.; lead, 3.50c.; pewter, 23c.; tinfoil, 28c.; tea lead, 3.50c.

Iron and Industrial Stocks

NEW YORK, April 7, 1915.

The activity in the stock market has continued unchecked, the rise in prices not having been affected by the receivership of the International Mercantile Marine Company. All stocks have made new high records for this movement. Bethlehem common fell on Tuesday after President Schwab again announced no dividends in sight, but quickly rallied. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	11⅛ - 13⅛	Lackawanna St'l	32¼ - 36
Allis-Chal., pref.	44¼ - 47	Nat. En. & St., com.	12½ - 13½
Am. Can, com.	31¼ - 32⅞	Nat. En. & St., pref.	79 - 80
Am. Can, pref.	95½ - 96⅝	Pressed Stl., com.	32⅝ - 34⅝
Am. Car & Fdy., com.	46½ - 49¼	Pressed Stl., pref.	96⅝
Am. Car & Fdy., pref.	114 - 114½	Ry. Spring, com.	23¾ - 25½
Am. Loco., com.	27¾ - 36¼	Republic, com.	22¼ - 24¼
Am. Loco., pref.	85 - 93¾	Republic, pref.	78 - 80
Am. Steel Fdries.	27½ - 31	Rumely Co., com.	1 - 3½
Bald. Loco., com.	35 - 39	Rumely Co., pref.	5 - 9½
Bald. Loco., pref.	96 - 99	Sloss, com.	27 - 33
Beth. Steel, com.	83¾ - 94½	U. S. Steel, com.	47¾ - 50½
Beth. Steel, pref.	104½ - 105½	U. S. Steel, pref.	105½ - 106⅝
Colorado Fuel	27 - 30½	Va. I. C. & Coke	42 - 43
General Electric.	142⅝ - 149½	West'gh'se Elec.	71½ - 77½
Gt. No. Ore Cert.	34¼ - 36⅝	Chic., Pneu. Tool	51 - 53
Int. Harv. of N. J., com.	96½ - 98	Cambria Steel	43 - 46⅛
Int. Harv. Corp., com.	65 - 70	Lake Sup. Corp.	5⅝ - 6⅝
Int. Pump, com.	1⅜ - 2	Warwick	9½
Int. Pump, pref.	7	Cruc. Steel, com.	14 - 15
		Cruc. Steel, pref.	77 - 83½
		Harb.-Walk. Ref., pref	99

Dividends

The General Motors Company, regular semi-annual, 3½ per cent. on the preferred stock, payable May 1.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent. on the preferred stock, payable April 20.

Chesapeake Iron Works Expands

The Chesapeake Iron Works, manufacturer of ornamental and structural steel, Baltimore, has acquired control of the Lauer & Harper Company, Westport, Md. The Lauer & Harper Company has specialized in the manufacture of bridges and bridge material. The business will be continued under the name of the Chesapeake Iron Works and will be enlarged so as to include that of the Lauer & Harper Company. It is the intention of the company to abandon its present plant, which is on leased property, and move its equipment to the Lauer & Harper plant where it will have water as well as rail transportation facilities. This property includes five acres. The main building will be used as the structural shop and a new building, 62 x 120 ft. will be erected for the ornamental iron work department.

F. S. Chavannes continues as president and treasurer of the enlarged company. The other officers are: C. L. Applegarth and I. O. Harper, vice-presidents; R. C. Sandlass, chief engineer and general manager; L. M. Dryden, secretary; F. J. Brown, superintendent; C. H. Michael, assistant engineer; and G. A. Wieman, chief draftsman. The board of directors consists of the officers and Charles G. Smith, Edmund J. Wachter and A. A. Blakeney.

Pacific Coast Employers' Association

The Employers' Association of Oregon held its annual meeting Tuesday, March 23, at the Portland Hotel, Portland, Ore., with an attendance of 125 members and guests. James B. Kerr made an address on workmen's compensation; Earl Constantine, secretary of the Employers' Association of Washington, told of that organization's work and Prof. William F. Ogden of Reed College spoke on the "Duties and Difficulties of the Citizen of Today." The ninth annual convention of the United Metal Trades Association of the Pacific Coast will be held in Portland, Saturday, April 17.

German Steel Works Union's February Output

The shipments of the German Steel Works Union for February, 1915, were 266,905 metric tons, against 255,016 tons in January, and 482,925 tons in February, 1914. This is 11,889 tons more than in last January, but 216,020 tons less than in the same month a year ago. Of the total February shipments this year semi-finished steel constituted 66,050 tons (134,489 tons in February, 1914); railroad material, 140,490 tons (214,567 tons a year ago), and shapes, 60,365 tons (133,869 tons a year ago).

A notable shipment of high-grade pig iron, particularly for one day's movement, was made April 5 by the Buffalo Union Furnace for the Burden Iron Company, Troy, N. Y. There were 16 cars and 600 tons of iron in all. The iron was sold by M. A. Hanna & Co., Cleveland. The requirements stipulated closely not only phosphorus, manganese and sulphur, but also, it is understood, the carbon content.

The Canadian Fairbanks-Morse Company, Ltd., has been appointed selling agent in Canada for Penflex metal hose, manufactured by the Pennsylvania Flexible Metallic Tubing Company, Philadelphia. The first named company has branches in 14 cities of Canada and carries warehouse stocks.

The Dodge Mfg. Company, Mishawaka, Ind., has booked a large order for transmission machinery for the Du Pont powder mills, valued at about $1,000,000. With other orders in hand the plant is assured of steady operation for a year with a force of 1000 workmen.

Steel-Rail Specifications Grouped

Robert W. Hunt & Co., engineers, 2200 Insurance Exchange, Chicago, have issued a 16-page pamphlet, 8½ x 11 in., entitled "Standard Specifications for Steel Rails." A great deal of valuable information is here given. The leading position is assigned to the specifications for carbon-steel rails of the American Railway Association, adopted May 20, 1914. Then, in order, come the specifications for carbon-steel rails of the American Society for Testing Materials, adopted September 10, 1914, manufacturers' specifications for open-hearth rails, dated 1914, manufacturers' specifications for Bessemer rails, dated 1914, and specifications of the Colorado Fuel & Iron Company for open-hearth rails, dated February, 1913. Tables are given comparing common rail sections and also of the section number for common sections of standard rails from each rail mill.

Robert W. Hunt & Co. have inspected under their "special inspection" 3,374,475 tons of rails. This service was inaugurated in 1912, since when it has been operative at each mill rolling rails in the United States and Canada. "Special inspection" orders require experienced and competent inspectors to be located in each department of the mill night and day while the orders are being filled. This great inspection firm has branch offices in New York, Pittsburgh, London, St. Louis, San Francisco, Los Angeles, Cincinnati, Kansas City, Seattle, Dallas, Mexico City, Montreal, Toronto and Vancouver.

Construction Work Resumed on Minnesota Steel Company Plant

The United States Steel Corporation has ordered the resumption of work on the plant of the Minnesota Steel Company at Duluth. Soon after the outbreak of the war in Europe construction work at the Morgan Park site, which is in the extreme western part of Duluth, was stopped, similar action being taken at a number of localities in which the Steel Corporation was pushing new work. Vice-president John Rice has gone from New York to Duluth in connection with the resumption of operations this week. When work stopped last fall the two blast furnaces and 90 Koppers coke ovens were nearly completed and 10 open-hearth furnaces were under construction. Of the houses being built for employees 170, providing a total of 350 apartments, have been completed.

American Steel for South China

The steel and metal markets of South China will probably have to be supplied by the United States, according to Consul-General George E. Anderson, of Hongkong. Belgium and Great Britain have met these needs in the past. American mills can now quote lower than the British and freight rates are reported as favoring the former. There is a demand for rods and bars, nails, rivets, sheets and plates. Imports of such materials reach an annual value of $2,750,000 of which Hongkong takes one-fourth.

G. F. Cottrill, vice-president of the Green Car Wheel Mfg. Co., St. Louis, announces that he and K. L. Green, owners of the Mowry Car Wheel Works, Cincinnati, Ohio, have decided to discontinue operations at the latter point and have leased the plant. They will devote themselves exclusively to the St. Louis plant.

The Electrical Alloy Company, manufacturer of resistance materials, Morristown, N. J., has appointed as its Pacific coast representative the Maydwell Company, Inc., with offices at 408 Globe Block, Seattle, Wash.; 71 New Montgomery street, San Francisco, and 822 Central Building, Los Angeles.

The Pan-American Reduction Company, 140 Broadway, New York, recently incorporated, states that it is building plants in various parts of the country for the manufacture of manganese steel as well as metallic magnesium and its alloys, to meet a demand created by the European war.

FOUNDRY TRANSFER PITS

Methods of Handling Cores and Molds In and Out of Ovens

BY H. M. LANE*

With the ordinary style of core or mold ovens, when the car is drawn out it blocks the use of the oven until unloaded and reloaded. Good shop practice necessitates the use of equipment for the greatest possible percentage of the time the plant is in operation. A core or mold oven is a tool just as definitely as is a molding machine, and there is no reason for duplicating oven equipment when a smaller number used to better advantage can be made to accomplish the same results. The use of ovens continuously demands the shortest possible time between drawing of a car from the oven and returning a car to the oven.

There are three methods in use for changing cars so as to introduce any lot of cores or molds into the oven as quickly as possible.

THE TRAVELING CRANE FOR HANDLING CORES

First the space in front of the oven may be covered with a traveling crane, and the cars of baked molds or cores lifted from the track before the ovens, and set down in some other parts of the core room or molding room.

This method is open to the following objections. The cars must be provided with hooks or slings to make it possible for them to be handled with the crane. The handling of cars over other cars and over working spaces introduces a serious risk of accident from the falling of material on work or workmen. The fact that the wheels must be aligned with a track in each case necessitates at least two men for landing the car on the track.

The principal advantage resulting from this manner of handling lies in the fact that the cars can be set down in any part of the room where there is a vacancy without regard to the other cars standing on the tracks, and also the transfer pit is done away with. With the lifting of the entire car one must always have a traveling crane man at hand, but in most large foundries, or particularly core rooms doing heavy work, a crane is available.

REMOVABLE RACK FOR LOADING CORE TRUCK

The second method of handling involves a plain flat truck, which runs in and out of the oven, and a rack, which may be lifted from the car or truck and set in any part of the core room or taken to the molding floor and used as a storage rack until the cores are set in the molds.

The use of a separate rack is open to all the objections of lifting the entire car with the exception of the fact that the crane does not have to handle the running gear of the truck. With this method a more efficient style of bearing can be used on the cars which enter the oven so that the friction can be greatly reduced.

USE OF A TRANSFER PIT

The third method of handling car loads of cores or molds to the ovens involves the use of a transfer pit. Now transfer pits vary greatly in design both as to the pit and as to the transfer car. In the older style of pit the transfer car is made of considerable hight with the wheels well below the track on which the core or mold cars are run. Such pits are usually made 18 in. to 3 ft. in depth, and extending along the front of the ovens within 1 to 3 ft. of the ovens. The cars of the cores or molds are run to the transfer car by hand in the case of small cars, and in such cases the transfer car is also moved by hand.

Sometimes a turntable has been placed on a transfer car so the cars of molds or cores may be turned and run on a track at the end of the transfer pit, this track being at right angles to the loading tracks in the core room. The introduction of a turntable on the transfer car should, however, be avoided if possible, as it complicates the construction of the transfer car and introduces additional chances for shaking down the green cores.

In the case of ordinary automobile foundry work a car load of cores weighs 4000 to 8000 lb. and such cars can be pushed by hand by two or three men at a fair rate of speed, provided suitable bearings are used, both on the car and the transfer car.

In some states the labor laws demand a railing around any pit over a certain depth, the minimum being placed at 10 to 12 in. Where this is the case the shallow transfer pit must be used. The shallow transfer pit also has the advantage of forming a part of the core room floor which can be used as a general passage across the front of the ovens.

In most core rooms the cars are pushed into and drawn from the oven by hand and the transfer car is moved from oven to oven, or track to track by hand. In cases where the shifinting of a car can be accomplished by two or three men in such a way that the drawing of the car from the oven to the transfer car and its shifting to another track does not exceed 4 or 5 min. and the replacing of a car of green cores in an oven, involving the shifting of two cars, does not exceed 15 min., the hand method of shifting is generally satisfactory, and it would be difficult to devise a power method that is cheaper.

HANDLING CARS BY POWER

Where mold cars involving weights of 10 tons or more have to be shifted, it is absolutely necessary to employ power for moving the mold cars as well as the transfer cars. Several methods have been devised for this purpose. In a number of foundries air hoists have been installed with a multiplying arrangement similar to that used in an elevator so that a 5 or 6-ft. stroke of the air cylinder would move the car two, four, six or eight times the distance. Where there is a considerable amount of work and cars are shifted frequently a device of this kind will be found useful.

Another method of pulling the cars in and out of the ovens is to have a pulley fastened at the back of the oven and another in the floor in front of the oven. A rope is used to pull the car in and another one to drag it out, the ropes generally being operated by the traveling crane. In cases where the distance traveled does not exceed the vertical hoist of the crane, a method of this kind is very satisfactory. It is also fairly satisfactory where bridge travel of the trolley is involved. But where it becomes necessary to run the crane along the runway the introduction of an inclined pull on the rope is not satisfactory as the strain on the working parts of the crane and the wear on the cable is greatly increased. In other cases the cars are pushed in by hand and removed with the crane by hooking to a ring in the front of the car.

For simplicity the two-rope system is generally used for handling cars in and out of the ovens when the crane has a sufficient lift. The principal objection is that the ropes must be left on the floor or

*H. M. Lane Company, Detroit, Mich.

be stored somewhere when not in use, and they are always more or less of a nuisance.

For hauling the transfer car itself the crane is sometimes used, but where the transfer car passes from one craneway to another this method is not applicable. In some cases a stationary winch with a capstan is used for dragging the transfer car back and forth. The principal objection is that the operator at the winch cannot see when he has aligned his tracks on the transfer car with the tracks at the ovens or elsewhere. This generally necessitates some work with a bar to correct the alignment and frequently 5 or 6 min. is wasted in this way.

For handling heavy cars the ideal arrangement is to have a power operated transfer car with an electric motor and a trolley system. In this case the man rides on his transfer car and can align his tracks perfectly. It is also possible to mount a winch on the transfer car to pull mold cars or core cars to and from the transfer car.

The writer has seen 24 high priced core-makers engaged 8 to 12 min. at a time to move core cars. An absence of 8 min. from benches is equivalent to a break of 15 min., for these times of concerted effort tend to become visiting times and when the man returns to his bench he does not turn back into the swing of the work as readily as he might. At an average of 15 min. per man, the total time lost is equivalent to 6 hrs., or at 30 cents an hour, a total of $1.80. When we consider that this same labor could be performed by mechanical means with a force of three or four men, we immediately see the advantage of properly designed and installed handling appliances.

MACHINERY EXPORTS TO MARCH

Falling Off of $25,000,000 in Eight Months, but a Gain in Machine Tools

WASHINGTON, D. C., April 6, 1915.—The effect of the European war on exports of American machinery is shown in an interesting table prepared by the Bureau of Foreign and Domestic Commerce, covering the eight months ended February 28, 1915, as compared with the corresponding period a year ago. These figures show a total of $52,929,040 of machinery, machine tools, etc., exported during the first eight months of the current fiscal year as compared with $77,327,942 for the corresponding period of last year, a loss of 33 per cent. For the same periods the total domestic exports of merchandise of all kinds declined from $1,675,181,503 for the eight months ended February, 1914, to $1,601,299,505 for the eight months of 1915, a loss of only 4½ per cent. The total domestic exports for the eight months ended with February, in the two years, are classified by the bureau as follows:

	Eight Months Ended with February	
	1914	1915
Crude materials for use in manufacturing	$628,110,385	$329,084,307
Foodstuffs in crude condition and food animals	102,832,586	330,823,303
Foodstuffs partly or wholly manufactured	210,073,579	263,665,727
Manufactures for further use in manufacturing	247,799,649	208,663,955
Manufactures ready for consumption	482,007,097	429,399,523
Miscellaneous	4,358,247	39,662,690
Total domestic exports	$1,675,181,543	$1,601,299,505

METAL-WORKING MACHINERY SHOWS LARGE GAIN

In the exports of machinery since the beginning of the war that designed for metal working is easily the most important item and the only one running into seven figures which shows a gain over the corresponding period a year ago. The total for this class is given at $13,499,973 as compared with $9,311,242 for the same period of 1914. In this connection it is interesting to note that the corresponding total for the first eight months in 1913 was $10,500,047 and in 1912, $7,531,451. Of the total for the eight months of 1915, $2,523,722 is credited to the month of February, an amount proportionately as large as was reported for January, when the shipments in 31 days aggregated $2,903,740. Aside from metal-working machinery the only items showing an increase over the corresponding period of last year are electric locomotives and stationary gas engines.

The extent to which the war has affected the foreign business of a certain class of machinery manufacturers is graphically shown by these figures. This class embraces corporations which have maintained large manufacturing plants in certain of the foreign countries now engaged in the war, including those producing cash registers, sewing machines, shoe machinery, typesetting machines, typewriters, etc. In every one of these classes the reduction in exports exceeds the average decline in the entire list of machinery and in nearly every case the principal foreign plants of these corporations have been practically closed down by the war. As both the domestic and foreign business of these concerns is based largely on patents and hence in a sense is non-competitive, it may be assumed that the decline in exports is wholly due to a temporary reduction in demand and that the end of the war will mark the beginning of a compensating boom in foreign business that will speedily restore the average.

MACHINERY EXPORTS BY CLASSES

The following table shows in detail the exports of machinery for the eight months ended February, 1914 and 1915:

	Eight Months Ended with February	
	1914	1915
Adding machines	$1,015,661	$311,135
Air-compressing machinery	375,004	228,447
Brewers' machinery	239,246	89,994
Cash registers	3,212,332	945,801
Parts of	.....	76,552
Cotton gins	125,882	28,072
Cream separators	216,864	107,857
Elevators and elevator machinery	890,242	551,357
Electric locomotives	103,722	217,534
Gas engines, stationary	235,031	301,276
Gasoline engines	4,264,321	2,303,913
Steam engines	3,858,007	1,646,183
All other engines	692,439	373,913
Parts of	2,320,346	1,589,246
Laundry machinery, power	345,651	162,546
All other	377,306	154,413
Lawn mowers	208,640	178,970
Metal-working machinery (including metal-working tools)	9,311,242	13,499,973
Meters, gas and water	.....	211,691
Milling machinery (flour and grist)	826,852	550,313
Mining machinery	6,814,101	.....
Oil-well machinery	.....	1,467,521
All other	.....	2,723,480
Paper-mill machinery	430,895	404,504
Printing presses	1,626,912	941,666
Pumps and pumping machinery	2,499,998	1,568,345
Refrigerating machinery (including ice making machinery)	694,443	309,471
Sewing machines	7,476,154	4,065,058
Shoe machinery	1,100,393	741,378
Sugar-mill machinery	2,108,420	1,481,622
Textile machinery	1,176,127	992,123
Typesetting machines, linotype and other	1,303,106	540,086
Typewriting machines	6,821,746	2,902,165
Windmills	1,141,752	445,456
Wood-working machinery, sawmill	426,729	163,149
All other	943,165	416,957
All other machinery, and parts of	14,145,113	10,236,873
Total machinery, etc.	$77,327,742	$52,929,040

Certain changes of classification will be noted in the above table. In 1915 cash registers and parts were separately reported; gas and water meters were taken out of the total of "all other machinery," and mining machinery is divided to show separately that devoted to the drilling of oil wells. W. L. C.

Mining Engineers at San Francisco

The American Institute of Mining Engineers will hold its one-hundred and eleventh meeting at San Francisco, Cal., September 16 to 18, 1915. A special train will take the members and those of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the Society of Naval Architects and Marine Engineers and the International Engineering Congress, leaving New York September 9.

Book Reviews

Handbook of Machine-Shop Management. By John H. Van Deventer. Pages 374; 4 x 7 in.; illustrations and diagrams, 245. Published by the McGraw-Hill Book Company, New York. Price, $2.50.

As stated in the preface this book has been written to put in convenient book form much of the data which have been published from time to time in mechanical papers. These data all apply to elements or mechanisms of machine-shop management, and have the added value of having been at some time tried out.

As the title suggests, this book is in handbook form. It is divided into seven sections. The first section treats with the general control of a plant covering in a broad way the organization. In this section, and in fact all through the book, as much data as possible are shown in diagram form. Following the section on general control are sections on design control and equipment control. The section on equipment control is worthy of special notice in that it contains a compilation of much of the information on the standardization of machines and tools recently given out by Carl G. Barth. A commendable effort has been made to show to machine-shop managers the value of a competent selection of equipment.

There are sections on quantity and quality control and time and cost control. These sections might, to those familiar with the Taylor system of management, be termed routing and cost-keeping, as they treat with the different phases of a manufacturing-shop order and the co-related effort in modern manufacturing of keeping the time and cost on an order. It must be remembered that this book does not make recommendations, but simply arrays side by side different methods. And particularly is this true in the routing and cost-keeping sections, because, perhaps, more discussion exists to-day on those two divisions of manufacturing than on any of the others.

The last two sections treat with traffic and shipment control and with shop-hazard control. Under the traffic-control heading are given some of the duties of a traffic manager, and then are set down many interesting and instructive facts pertaining to shipping in these times. Under shop-hazard control are given facts and suggestions as to the safeguarding of machinery as used in the various types of manufacture and embracing fire prevention and sanitation.

To sum up, the handbook constitutes a big step in advance, where facts pertaining to shop management are concerned. Those who have been trying to collect and save data as it has been published from time to time will find gathered together in an intelligent manner in this book practically all that has been published to date. The book has a complete index which, with the profuse use of diagrams previously referred to, allows of the book's being used as a handbook in the strict sense of the word.

The A B C of Iron and Steel, with a Directory of the Iron and Steel Works of the United States and Canada. Edited by A. O. Backert. Pages 354, 8 x 11 in.; illustrations, 222. Published by the Penton Publishing Company, Cleveland. Price, $5.

Some 20 years ago a little volume was issued by a pig-iron salesman under the title "A B C of Iron." It dealt almost entirely with the manufacture and composition of pig iron, and gave elementary information as to analysis and fracture as the basis of grading. The book had a wide circulation, but it is now out of print. The A B C of Iron and Steel is made up of a series of articles originally published at intervals in the Iron Trade Review. They deal with iron mining, iron-ore transportation and valuation; the manufacture of beehive and by-product coke; pig iron, wrought iron, crucible steel and Bessemer and open-hearth steel; rolling-mill operations in part, including a chapter on wire drawing; the production of gray iron, malleable and steel castings and the manufacture of electric steel. John Birkinbine, who is probably better fitted than any man in the country to write of iron ore, contributes an important chapter on that subject. There are also chapters by various engineers, including J. L. W. Birkinbine, John J. Porter, James P. Roe, John Howe Hall, Kenneth Seaver, F. L. Kindl, Kenneth B. Lewis, R. A. Bull, Dr. Richard Moldenke and F. T. Snyder. Considerable statistical matter is presented, including the figures for the production of pig iron, steel ingots and various finished products in the United States over a period of years, and the iron-ore shipments from the various Lake Superior ranges.

Sixty-three pages are given up to a directory of companies in the United States and Canada making pig iron, wrought iron, steel and rolling-mill products, and the names of producers are classified according to product.

The Act to Regulate Commerce. By Herbert C. Lust, member of the Chicago Bar. Cloth. Pages, 141, 6 x 9 in. Publisher, La Salle Extension University, Chicago.

This is one of the volumes of a course in interstate commerce and railroad traffic issued for use in home study and designed to meet the constantly growing demand for efficiently trained men in railroad and industrial traffic work; to assist students to pass the examination for commercial service under the Interstate Commerce Commission and to meet the demand for men competent to direct the work of commerce organizations and traffic bureaus. It gives the full text of the act to regulate commerce as amended and revised to November 1, 1914. The mere text of this act, however, would not be of great value to those who are studying the full effect of this effort to apply governmental regulations to railroads. The author, therefore, has drawn from decisions and applications of various provisions of the act a great mass of illuminating information. This is thoroughly digested and logically arranged in a number of sections which treat of such subjects as discrimination facilities, long-and-short-haul rule, pooling of freight, parties to complaints, penalties, methods of procedure before the commission, etc. The principles governing the movements of interstate traffic have been so condensed and simplified that a study of these pages will enable any one to apply the act intelligently.

The Law of Carriers of Goods. By Ralph Merriam, member of the Chicago Bar. Cloth. Pages, 180; 6 x 9 in. Publisher, La Salle Extension University, Chicago.

This volume is also a part of the course in interstate commerce and railroad traffic, above referred to. The preface states that it is intended to supply the reader with a knowledge of the elementary principles of the law of carriers of goods and to furnish him training in the analysis and application of the decisions of the courts. It is not designed to cover in detail the almost limitless legal points growing out of the subject treated. The book is written in clear language, devoid of abstruse legal terms, and its contents are logically arranged. Beginning with the discussion of the question as to who are common carriers, it proceeds to the duty of the common carrier to accord indiscriminating service at a reasonable rate, then takes up such subjects as delivery to carrier, relation of liability, duties and functions of connecting carriers, bills of lading, acts against carriers, carriers' compensation, carriers' lien, etc. The book is based on interpretations of the law as made by judicial decisions, and the cases cited are referred to by notes.

The report of the Boiler Code Committee of the American Society of Mechanical Engineers, covering "Rules for the Construction of Stationary Boilers and for Allowable Pressures," may be obtained from the society, 29 West Thirty-ninth street, New York City, at 20c. per copy in lots of 2000 or over; 30c. per copy in lots of 1000 to 2000; 40c. in lots less than 1000 delivered; 80c. for individual orders delivered to non-members.

A chart showing the price fluctuations of manila, sisal and New Zealand hemp in the years 1905 to 1914, inclusive, has been issued by the fiber department of Otto Isenstein & Co., 90 Wall street, New York City. In addition, tables are given showing the production, receipts and deliveries at various points for the three kinds of product.

CENSUS BUREAU NO INQUISITION

Manufacturers May Look for Simpler Schedules Hereafter

WASHINGTON, D. C., April 6, 1915.—Erroneous impressions with regard to the scope of the inquiries now being made by the U. S. Census Bureau as the basis for the 1914 census of manufactures are being received by manufacturers in certain districts as the result of over-zeal on the part of special agents who have misinterpreted the carefully prepared instructions of the bureau. Complaints have recently been made that agents have added to the regular schedules of inquiry and the supplemental schedules issued for certain industries questions of an inquisitorial character, which the officers of the average business concern would naturally object to answering. The practical effect of these indiscretions on the part of special agents has been to annoy manufacturers and render them reluctant to furnish the bureau with any information regarding their affairs. As this attitude is regarded by the bureau officials as likely to imperil the integrity of the census statistics and as the action of the special agents referred to is wholly unwarranted, the correspondent of *The Iron Age* is authorized to state the position of the bureau with reference to this matter with the utmost positiveness.

Every inquiry addressed to manufacturers by the Census Bureau is embodied either in the general or special printed schedule. The general schedules go to all manufacturers, and the special or supplemental schedules to all who are engaged in industries of sufficient importance to justify the bureau in preparing special industrial reports thereon. The bulk of these schedules were sent out by the bureau by mail last December with the request that they be filled in and returned to Washington as soon after January 15 as possible. Early in February special agents were put into the field to visit manufacturers who up to that time had not made returns or whose returns were incomplete or obviously inaccurate. It was also the duty of the special agents to make a careful canvass of their respective districts for the purpose of locating new manufacturing concerns not previously listed by the bureau.

SPECIAL AGENTS MUST STICK TO SCHEDULES

In carrying on their work, special agents were instructed to solicit no information not expressly called for by the schedules sent out by the bureau, to use discretion and diplomacy in carrying on their work so as to avoid annoyance to parties visited and, where such service would be acceptable, to offer to assist in the preparation of schedules. It will be seen, therefore, that special agents who have demanded information not included in the regular schedules have exceeded their authority and have embarrassed the work of the bureau as well as annoyed the parties whom they have visited. *The Iron Age* is authorized to state that the Census Bureau officials will be glad if manufacturers who are called upon for data not embraced in the regular schedules will peremptorily refuse to furnish the information and promptly notify the Director of the Census of the name of the special agent making the demand.

The bureau from time to time has found a few manufacturers who were reluctant to furnish the information called for by the standard schedules because of their unwillingness to have their individual operations disclosed through the publication of the data desired by the bureau. In practically all of these cases, however, this reluctance has been due to a misunderstanding of the methods employed by the bureau in tabulating returns. In all cases the returns of individual establishments are so aggregated with others as to make it impossible for any one to obtain information concerning individual operations. For example, in the event that less than three concerns in any given industry are located in a single State, the statistics of those concerns, instead of being combined and published under the appropriate industrial head, are included among "all other industries" in the State.

Another interesting feature of the bureau's policy that will be appreciated by manufacturers is its refusal to furnish information to anyone, whether it be senator, representative, departmental official, State official, or private citizen, calculated to disclose the details of the business of concerns making returns. Great pressure occasionally has been brought to bear upon the bureau to obtain such information and many inquiries have been received for data as to the relative importance of the so-called "trusts" and the "independents" in various industries, but the bureau has invariably refused to supply the data desired and has informed all inquirers that it has absolutely no information regarding so-called trust control of industries and has carried on its work upon a purely statistical basis.

FEWER CENSUS BUREAU DEMANDS HEREAFTER

It is probable that the Census Bureau will never again undertake so elaborate a census as that now being compiled. A number of considerations have brought about this consensus of opinion on the part of the officials. It is believed that a large portion of the statistics as now gathered serve no useful purpose, double the cost of the work, delay the publication of the really valuable data, duplicate the work of other official and unofficial statisticians and add unnecessarily to the burdens of the business men who are called upon to make returns. The special industrial reports, in particular, are regarded as unnecessary in view of the elaborate reports compiled at frequent intervals by great trade organizations, like the American Iron and Steel Institute, the intensive studies that are constantly being made by Federal and State commissions and the practical impossibility of publishing the reports in time to give them anything but a historical value. The official demands upon manufacturers for information regarding their business have so increased in recent years as to constitute a serious item of expense and an important detail of office organization. Thousands of manufacturers are now subject to calls at frequent intervals from the Census Bureau, the Federal Trade Commission (heretofore the Bureau of Corporations), the Bureau of Foreign and Domestic Commerce, the Bureau of Labor Statistics, the income tax division of the Internal Revenue Bureau, the Interstate Commerce Commission, the United States Geological Survey, the United States Commission on Industrial Relations and other federal bureaus and commissions, all of which are clothed with more or less authority to enforce their demands. In addition, requests are also being made by State labor bureaus of statistics, factory inspectors, public service commissions, etc., etc. The cost of complying with all these manifold demands may easily run into thousands of dollars in the case of any manufacturing concern of moderate size, while a big corporation is usually obliged to keep an expert corps of accountants constantly at work compiling figures and filling up returns on Federal and State requisitions, the expense constituting a relatively large item.

The most experienced officials of the Census Bureau express the opinion that census schedules in the near future will be so simplified as to call for a few salient figures only, including the most important items now embraced in the general schedules, probably capital, number of employees, total wages paid, cost of materials, and value of products. These statistics, conscientiously prepared and carefully compiled, would furnish all the information needed for statistical or historical purposes and could be secured, compiled and published in less than one-half the time now required and for much less than one-half the present cost. No manufacturer would hesitate to furnish such information, and special agents to follow up missing or incomplete schedules would be unnecessary, except in a very few cases.

Work on the 1914 census of manufactures is progressing rapidly and, owing to careful preparations made in advance, a larger number of complete schedules have been received than upon the corresponding date in any previous census. The bureau officials are striving to complete the compilation and publication of the general reports before the end of the current fiscal year and will probably be able to do so. W. L. C.

OBITUARY

William T. Simpson

William T. Simpson, first vice-president of the American Rolling Mill Company, Middletown, Ohio, died after a lingering illness at his home in Cincinnati, March 31, aged 59 years. He was associated with George M. Verity, president, and R. C. Phillips, secretary, in the organization of the company in 1899, and had been first vice-president from that time until his death. He was a native of Saratoga County, N. Y.,

WILLIAM T. SIMPSON

and had been actively engaged in the iron and steel business since he was 18 years of age. He was proprietor of the first galvanizing plant established west of the Allegheny Mountains. The American Steel Roofing Company, Cincinnati, of which Mr. Verity was vice-president and manager, bought galvanized sheets from him for many years. In 1899, with Mr. Phillips, Mr. Simpson organized the Cincinnati Rolling Mill Company, whose plant was located at Riverside, Ohio, and the American Steel Roofing Company continued to purchase sheets from him while he operated that mill. This early association resulted in the three men getting together in the organization of the American Rolling Mill Company. For the past 10 years Mr. Simpson spent practically all his time in looking after the interests of the American Rolling Mill Company's plant located at Zanesville, Ohio, and in superintending the development and production of Armco terne plate, to which he paid particular attention. In respect to his memory the three plants of the American Rolling Mill Company suspended operations April 2 for 30 minutes at the time the funeral services were held in Cincinnati. He was a prominent member of the Cincinnati Chamber of Commerce and Cincinnati Business Men's Club. He leaves his widow.

WILLIAM DISSTON, president of Henry Disston & Sons, Inc., steel and saw manufacturers, Tacony, Philadelphia, died April 5 at his summer home, near that city, aged 56 years. He was born in Philadelphia, was a son of Henry Disston, founder of the business, and was graduated from the Episcopal Academy. For seven years he served as a workman in his father's saw factory, acquainting himself with the duties of every department, which eminently fitted him to assume the management of the huge enterprise. He became president in 1896, on the death of his older brother, Hamilton Disston. In addition to being president of the saw works he was the head of the Henry Disston & Sons File Company and the Henry Disston & Sons Steel Works. He was a member of the Union League and a director of the German-American Title & Trust Company, Tacony Trust Company and Pelham Trust Company. In social and club circles he had been prominent for years. With other members of his company, Mr. Disston did much for the improvement of Tacony, where a large majority of the employees of his plants live. He leaves his widow, one son, William Dunlop Disston, who is vice-president of the company, and a daughter.

CURTIS GUILD, JR., Boston, Mass., died April 6, from pneumonia, after a short illness, aged 55 years. His father was founder of the Boston Commercial Bulletin and in 1884 he was admitted to partnership in its ownership, taking sole charge of the paper in 1912. He was born in Boston and was graduated from Harvard College in 1881. His political career began at the age of 21. In 1912 he was elected Lieutenant-Governor of Massachusetts, and in 1905 was elected Governor, being re-elected twice. In April, 1911, he was appointed ambassador to Russia by President Taft. He served in the Massachusetts National Guard, becoming a brigadier-general. Entering the United States army in the Spanish-American war, he was made a lieutenant-colonel and inspector-general. At the close of the war he received the title of major-general of the Massachusetts National Guard.

WILLIAM K. PIERCE, formerly manager of the Pierce, Butler & Pierce Mfg. Company, Syracuse, N. Y., committed suicide at Washington, D. C., April 5. He was a graduate of Cornell University and managed the business of the company above named from 1893 until it became bankrupt in 1914. After the failure he suffered a breakdown in health, since which time he has been endeavoring to recuperate. He leaves his widow and three children.

THOMAS L. FOWLER died March 31 at his home at Richmond Hill, Long Island, N. Y., aged 63 years. His first business connection was in 1872 as a clerk with the Ansonia Brass & Copper Company. He was afterward associated with the Aluminum Bronze Company, Bridgeport, Conn. For the past 20 years he had been the New York selling agent of the Detroit Copper & Brass Rolling Mills. He leaves his widow and one child.

DANIEL B. HINCKLEY, who is said to have started the first foundry in San Francisco, died March 25 at the home of his son, H. G. Hinckley, in Fruitvale, Cal., aged 89 years. He was a native of Worcester, Mass., and moved to San Francisco in 1850, starting the old Pacific Foundry at Davis and California streets. In 1857 he started the Fulton Foundry, which was succeeded by the Fulton Iron Works.

FREDERICK DIETZ, senior partner in R. E. Dietz & Co., among the largest manufacturers of lanterns in the world, died March 30 at his home in New York City. He was a member of the Union League and the New York Athletic and Hardware clubs.

GEORGE W. PRENTISS, founder and head of George W. Prentiss & Co., wire manufacturers, died April 2 at his home in Holyoke, Mass., aged 87 years.

Industrial Traffic League Postponement

The spring meeting of the National Industrial Traffic League, which had been called for April 8 and 9 at Memphis, Tenn., has been postponed until about the middle of May, the definite date to be announced later. Numerous members had stated their inability to be present on the dates first fixed because of important hearings before the Interstate Commerce Commission regarding the proposed Western freight advance and other cases. The president of this association is H. G. Wilson, commissioner of traffic, Toledo Commerce Club, Toledo, Ohio. The secretary and treasurer is O. F. Bell, traffic manager of the Crane Company, 413 Tacoma Building, Chicago.

PERSONAL

Henry R. Towne, chairman Yale & Towne Mfg. Company; W. H. Childs, president American Coal Products Company; Waldo H. Marshall, president American Locomotive Company; Gilbert H. Montague, attorney, and W. M. Gladding have been appointed a special committee of the Merchants' Association of New York to advise with the Federal Trade Commission regarding the administration of the law it was appointed to enforce.

Charles T. Kruse has been made superintendent of the Marquette and Menominee range mines of the Jones & Laughlin Steel Company.

Dr. Pierre DeP. Ricketts and Dr. John H. Banks, consulting engineers and metallurgists, have dissolved their partnership, Ricketts & Banks, and each will carry on the same business independently. Dr. Ricketts will have his offices at 80 Maiden Lane, and Dr. Banks at 61 Broadway, New York.

Richard Peters, Jr., who has been connected with the W. J. Rainey coke interests at Uniontown, Pa., for the past year or two, has been appointed assistant to the general manager of W. J. Rainey, with headquarters at 52 Vanderbilt avenue, New York.

Howard A. Kerr has been transferred from the general sales department of the Trumbull Steel Company at Warren, Ohio, to the Eastern district sales office, Grand Central Terminal, New York.

James Aston, metallurgist, has resigned his connection with the University of Cincinnati to enter the service of the United States Bureau of Mines to carry out an investigation of safety and efficiency in steel plant operation.

Boyd E. Jack, recently identified with the Inland Steel Company, Indiana Harbor, Ind., has been put in charge of the new sheet mills of the Empire Rolling Mill Company, Cleveland, Ohio.

John W. Cowper, for many years vice-president of the Lackawanna Bridge Company, Buffalo, N. Y., has resigned to become president of the John W. Cowper Company, recently incorporated to do a general engineering and contracting business, with offices in the Fidelity Building, Buffalo. F. D. Huntington, for some years associated with the English contract department of J. G. White & Co., Inc., and more recently with the Brazil Railways, is vice-president of the new company.

A. L. Scott has retired from the presidency of the Pacific Hardware & Steel Company, San Francisco, and has been succeeded by H. J. Morton, former first vice-president.

The Standard Aluminum Company, Two Rivers, Wis., announces the retirement of William Bremer as president and the succession to that position of Herman Wentdorf, until now secretary. Mr. Wentdorf is succeeded by Louis Gloe. The company is enjoying exceptionally brisk business.

F. M. Sanders, of Sanders Brothers & Co., London, dealers in iron and steel, is now in the United States on business connected with exports to Great Britain.

J. P. Rapp, steel wheel specialist, has resigned from the Forged Steel Wheel and allied companies, and has been appointed vice-president of the Gulick-Henderson Company, inspecting, consulting and chemical engineer, 30 Church street, New York. Mr. Rapp assisted Charles T. Schoen in developing his wheel, and has been directly connected with the industry from its earliest inception. He will give this item of railroad equipment his particular attention.

David Ball, engineer, Buffalo Foundry & Machine Company, Buffalo, N. Y., has been appointed chairman of the general committee to have charge of the meeting of the American Society of Mechanical Engineers to be held in Buffalo, June 22 to 25. H. P. Parrock, Lumen Bearing Company, is chairman of the reception committee; David C. Howard, president De Laney Forge & Iron Company, Buffalo, is chairman of the entertainment committee, and Willis H. Carrier, chief engineer, Buffalo Forge Company and vice-president Carrier Air Conditioning Company, is chairman of the hotel committee.

Charles E. Carpenter, general manager of sales, Allied Machinery Company of America, New York, has gone to Paris. The company has engaged the services of Bergen Erichsen, a brother of Eivind Erichsen, who recently entered its employ also. Everett Brown, formerly of the National City Bank, will sail for Europe April 17, in connection with the accounting branch of the Allied Machinery's Company's business.

J. Franklin Ervin, who has been connected for some time with Deere & Co., Moline, Ill., has accepted the position of general superintendent of the Whitman Agricultural Company, St. Louis.

David Linquist, chief engineer of the Otis Elevator Company, is to present a paper before the American Society of Mechanical Engineers on Tuesday evening, April 13, at the Engineering Societies Building, 29 West Thirty-ninth street, New York. Among the topics he plans to cover are traction elevators, comparing gearless with geared traction, and the application of ball and roller bearings to elevator machinery.

Demurrage Charges and Weather Conditions

WASHINGTON, D. C., April 5, 1915.—A series of rules governing the suspension by carriers of track-storage and demurrage charges, due to weather conditions, is laid down by the Interstate Commerce Commission in deciding a case recently brought against the New York Central & Hudson River Railroad Company by Murphy Brothers, New York. A petition for reparation was filed by the complainants against the carriers based on alleged unreasonable assessment of track-storage charges and demurrage, which the complainants assert should have been waived by the carriers because, owing to stress of weather, it was not practicable to unload the cars in question. The provisions of the defendant's tariff relating to this class of charges are as follows:

> No track-storage charges will be assessed on shipments held in cars due to weather interference, viz:
>
> 1. When the condition of the weather during the prescribed free time is such as to make it impossible to employ men or teams in unloading cars without serious injury to the freight.
>
> 2. When shipments are frozen so as to prevent unloading during the prescribed free time, or when, because of high water or snowdrifts, it is impossible to get to cars for unloading during the prescribed free time.

The principal controversy in this case, the commission finds to have arisen because of the different interpretations of the words in the tariff "impossible to unload." In laying down a rule for the guidance of both shippers and carriers in such cases, the commission says:

> Manifestly the words "impossible to unload" can not be given a literal interpretation. They must be construed in a reasonable manner. Weather conditions that would ordinarily prevent unloading might not prevent one shipper under the stress of unusual circumstances from unloading, regardless of weather conditions. The test should not be whether or not some consignee unloaded cars at the same place during the same period, but whether or not, considering the character of the freight, other consignees reasonably could and did unload. When a dispute arises, the United States Weather Bureau reports should be given proper consideration, and these, the claims and records of consignees, and the records kept by carriers' agents should be considered together in reaching a conclusion as to whether or not the weather conditions were such as to entitle consignees to waiver of track-storage charges. Refusal to apply a reasonable interpretation of this rule, thereby depriving complainants of refunds lawfully due, subjects them to unlawful charges just as much as if they were charged more than the lawful rate for transportation.

The commission, therefore, directs the defendants to review the claims filed by the complainants in the light of the views above expressed and make such refunds as may be found to be due the complainants. W. L. C.

Pittsburgh and Nearby Districts

The Carbon Steel Company, Pittsburgh, has received contracts from the Government for between $300,000 and $400,000 worth of specially treated steel plates and also for a large quantity of nickel-steel plates for the new battleship No. 42, to be known as the California. The price received for the specially treated steel plates under this contract was 7.15c. per lb., while for the same quality of steel two years ago the company received 9.85c. per lb. The exact amount involved in these contracts is not yet known, as specifications will not be received for several months.

The Republic Iron & Steel Company is planning improvements in the boiler houses at its Bessemer steel works and Brown-Bonnell plants in Youngstown, Ohio. While the plans are not fully developed, it is intended to concentrate the five boiler houses at two points and provide modern coal and ash handling machinery, also stokers and superheaters. No new boilers will be needed for the work and as much of the old equipment will be used as possible. In March the various plants of the company in Youngstown operated to about 90 per cent., based on steel-ingot capacity, and at the rate specifications are now coming in the company expects to run as well or slightly better all of this month.

The new foundry of the Erie Stove & Mfg. Company, Erie, Pa., for which it will take bids about May 1, will be 200 x 250 ft., and is estimated to cost $75,000.

The Osborn Machine Company, DuBois, Pa., plans to build a foundry, 50 x 140 ft., but has not formulated details. J. R. Osborn is secretary.

The Electrical Material Company, North East, Pa., is taking bids for a foundry, 40 x 90 ft.; a machine shop, 35 x 120 ft.; a forge shop, 40 x 90 ft., and a power house, 24 x 66 ft. The aggregate estimated cost is $100,000. O. O. Hertzel is president.

On Tuesday, April 6, stockholders of the Youngstown Sheet & Tube Company met at Youngstown, Ohio, and approved the resolution of the board of directors to issue $5,000,000 more preferred stock to provide capital for large plant additions. So far the only thing of this kind decided is the building of 200 or perhaps 204 by-product coke ovens, work on which will start soon.

The steel plants in the Youngstown district are operating this week to an average rate of probably 90 per cent. of capacity, the highest reached in more than a year. All the steel works blast furnaces in Youngstown are in operation, the only idle stack in the vicinity being that at Niles, Ohio, owned by the Carnegie Steel Company. The only idle merchant stacks are those of the Ohio Iron & Steel Company and the Andrews & Hitchcock Iron Company, on all three of which repairs are being made. At the Ohio works of the Carnegie Company all blast furnaces, the Bessemer and open-hearth steel plants and the sheet bar mills are running. The Republic Iron & Steel Company is operating full, with the exception of the 8-in. hoop mill and the 12-in. bar mill, which may go on late this week; this company has started Atlantic furnace at New Castle, Pa., and now has only one idle stack, this being the small Hall furnace at Sharon. The Youngstown Sheet & Tube Company is operating all blast furnaces and the Bessemer and open-hearth steel works, while the various finishing mills are operating to 90 per cent. or more. The Brier Hill Steel Company is running its open-hearth steel plant, its two blast furnaces and its Falcon and Empire sheet mills at Niles, all on full time. The Youngstown Iron & Steel Company is operating eight of its nine sheet mills, and its pressed steel department is running full. The Girard Iron Company's 88 puddling furnaces at Girard, Ohio, are in operation, the skelp mills being idle.

The Republic Iron & Steel Company recently filled an order for 1000 tons of 3-in. steel rounds for shipment to England, and an order for 500 tons of Bessemer billets for export.

Probably 500 or more members of the Amalgamated Association employed in sheet mills in the Wheeling district held a meeting April 4, at which they decided to withdraw from that organization and form a new one to be known as the United Iron and Steel Workers of America. A meeting is to be held April 18, also in Wheeling, to elect permanent officers. This action is the result of dissatisfaction over the recent vote by lodges of the Amalgamated Association, under which it was agreed to accept a reduction of about 11.2 per cent. in sheet-mill wages.

The report that the Crucible Steel Company of America, Pittsburgh, had taken contracts for war materials amounting to $150,000,000 is officially denied by Herbert Dupuy, chairman of the company. He not only says that no such orders have been taken, but that it is untrue that his company will spend $6,000,000 for additions to its present plants.

The W. B. Pollock Company, Youngstown, Ohio, has taken a contract for the plate stills for the benzol plant to be erected by the Republic Iron & Steel Company.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, turned out over 8000 tons of black and galvanized sheets in March.

The Cambria Steel Company, Johnstown, Pa., has completed six tanks 12 ft. in diameter and 40 ft. high, for the Dominion Iron & Steel Company, Sydney, N. S., which is building a benzol plant for Thomas A. Edison, Inc.

The regular monthly meeting of the Association of Iron and Steel Electrical Engineers will be held in the Seventh Avenue Hotel, Pittsburgh, on Saturday evening, April 10, preceded by a dinner. A. W. Soderberg, assistant mechanical engineer of the Carnegie Steel Company, Pittsburgh, will present a paper on "Apprenticeship and Educational Work in the Iron and Steel Industry." The May meeting will be held May 1, at the same place, and R. S. Wile, president Wile Electric Furnace Company, Empire Building, Pittsburgh, will then present a paper on "The Electric Furnace and the Melting of Alloys."

Bethlehem Earnings to Go Into Plant

President Charles M. Schwab, of the Bethlehem Steel Corporation, at the annual meeting in Newark, N. J., April 6, stated that between $20,000,000 and $30,000,000 would be needed in the next few years to extend and develop the properties of the corporation. The inference drawn from this statement is that dividends on the common stock are not being seriously considered by the management. When suggestions were made that he might say something definite about dividend prospects, he declined, stating that he would not say anything that might be construed as approving or showing any connection with the stock market, stating that he was not interested in stock market movements. He further said:

> Heavy expenditures are in view for developing the Chilean mines and extending the plants at Bethlehem, in addition to the $40,000,000 already spent. The management feels that this construction should be provided for out of earnings, as our bonded debt is larger than our capital stock. I hope that the stockholders will approve of this policy.
>
> The past year has been gratifying to the officials and I hope to the stockholders. The shareholders have been rewarded for their patience by now seeing a substantial profit on their securities. While the year so far has been very bad for the general steel business, the Bethlehem Company has been fortunate in being engaged in the manufacture of lines which are in strong demand. The general business outlook is encouraging. I think the steel business will show an improvement in volume of orders, but I hardly look for much higher prices.

The retiring directors were re-elected for three years.

New Australian Steel Plant Ready

The new steel plant of the Broken Hill Proprietary Company, Ltd., New South Wales, was expected to start operations in March. Rails are to be made by the basic open-hearth process. The first blast furnace is expected to turn out 10,000 tons of pig iron per month.

Machinery Markets and News of the Works

WAR DEMAND STRONG

Three Months' Sales Equal Those of 1914

Foreign Buying Sustained, While the Volume of Domestic Business is Greater and More Diversified

The great impetus given to the machine tool industry by the demand for equipment to be used in the manufacture of munitions of war both here and abroad shows no indications of lessening despite predictions that early autumn will see the end of hostilities. Evidences of increased buying for needs entirely apart from those of the war are seen here and there.

In the first quarter of 1915 leading New York dealers did more business than they did in all of 1914, and recent buying is of a more diversified character. Foreign customers are more conspicuous than ever in New England, but manufacturers there are striving to give preference to American consumers. Manufacturers who are doing war work have ordered heavily in Cleveland. All classes of machines are in better demand in Detroit. Domestic orders are scattering in Chicago and there, as elsewhere, the war business is greatest. The home trade is dragging in Milwaukee, but the foreign business is brisk. Cincinnati builders of machine tools are conducting their foreign business on a more conservative basis. In that city the railroads show a tendency to have machine tools repaired instead of buying new ones. Inquiries are more numerous in the Central South. Conditions continue to improve in the Birmingham district. The machine tool business in St. Louis is at low ebb. In the Pacific Northwest business is not notable, except for a demand for dredging machinery. The machine tool trade in San Francisco is quiet.

New York

NEW YORK, April 7, 1915.

With prominent dealers in machine tools the aggregate of March sales was as good as that of February, despite the fact that in the former month they did not receive such record-breaking orders as were booked in February. Many large orders were received, nevertheless. One dealer did more business in the first quarter of this year than he did in all of 1914. Miscellaneous buying, a good part of which is entirely independent of the war demand, is going on at a fairly satisfactory rate, though of itself it would not suffice to keep the trade employed. The activity of the month just ended is considered of a healthier sort than that of February for the reason that the machinery ordered has been more widely distributed.

The Robins Dry Dock & Repair Company, Brooklyn, N. Y., is expected to be in the market soon for a number of machine tools. The Locomobile Company of America has been a heavy purchaser of equipment for its new plant at Bridgeport, Conn.

Estimating on the making of shrapnel cases and shells and tentative inquiries for the machines required for that work are more general than ever and new purchases have been made as a result. The General Electric Company, Schenectady, N. Y., has ordered a number of machines such as are used in the manufacture of shrapnel, although it was denied a short time ago that the company was interested in work of that kind. The E. W. Bliss Company, Brooklyn, is a steady buyer.

Notwithstanding the fact that the American Locomotive Company has bought several hundred machines of the types used in shrapnel-making, the trade has not yet ascertained in which of its plants the manufacturing is to be done, though Richmond is thought to be the logical location. The statement that the company has closed a large contract to supply munitions of war is declared to have been premature as negotiations are not formally closed. The machinery, nevertheless, has been contracted for.

An excellent demand has developed for the high-speed drill made by Baker Brothers, Toledo, Ohio, as a tool for performing some of the operations incidental to shrapnel-making. Certain attachments have been devised to adapt the machine to the work.

Frequent rumors are heard to the effect that not a little trouble is being experienced by some of the firms who have undertaken the making of shrapnel cases, shells, or time-fuse parts. Of course, it is no easy matter to properly tool a large battery of machines for extremely precise work, while there is the question of getting operatives trained and organized and of studying the material that is worked. Some of the finished product already has been rejected by the inspectors representing the Allies, and a case is mentioned where several thousand fuse timers were thrown out as not up to standard. These difficulties, of course, will be overcome in time, but meanwhile the situation is expensive for the contractors concerned. In the making of the fuse timers the greatest difficulty encountered has not been in the machine work, but in loading them, as a variation of but 15 sec. is allowable in a fuse whose maximum time of burning is 21 sec.

The Phelps Heating Specialty Company, 210 Water street, New York, has been incorporated with a capital stock of $50,000 by C. S. Ashley, H. J. Neuschafer and R. A. Koontz, 295 Broadway, New York. It is not ready at this time to take up the matter of machinery, plant equipment, etc.

The Averill Stadiagraph Company, 141 Broadway, New York, has been incorporated to market a patented surveying instrument, which will be manufactured under contract. The compapy does not plan to build or maintain its own factory. C. K. Averill is president.

The National Welding Company, Morris avenue and Dickerson street, Newark, N. J., has leased a factory recently erected by the Paterson Vehicle Company, at 207 Paterson street, Paterson, N. J., where it will carry on a general machinery and repair welding business. E. P. Hoyt is president and William Phillips, general manager.

East Orange, N. J., will receive bids until 8 p. m., April 12, for a centrifugal pump and condensers. J. A. Reimer is secretary.

DeMuth & Co., Park avenue and Ashland street, Richmond Hill, Long Island, N. Y., manufacturers of pipes, will erect a four-story brick and reinforced concrete warehouse, 104 x 118 ft., and a two-story garage, 30 x 40 ft., at a total cost of about $75,000.

The H. H. Franklin Mfg. Company, Syracuse, N. Y., producer of die-cast parts, is having plans prepared for a three-story addition to its plant, 53 x 100 ft., to be used as an addition to its die-casting department. The additional equipment will be mostly of casting machines which the company will prouce itself, although a few additional machines, such as lathes, will be installed in the die shop, as may be required. The total expenditure will be about $40,000.

The Carborundum Company, Niagara Falls, N. Y., has purchased the Deerlick Oil Stone Company, but does not plan to develop its scythe-stone business at present.

The Board of Water Commissioners, Binghamton, N. Y., of whfch John D. Davidson is secretary, will take bids until May 15 for a horizontal cross-compound high-duty crank and flywheel pumping engine of 10,000,000 gal. daily capacity.

The Chevrolet Motor Company, Tarrytown, N. Y., has purchased the former Maxwell-Briscoe Motor Company plant on Beekman avenue and will put it in operation. This is in addition to the Kingsland Point plant of the former Maxwell-Briscoe Company, which was purchased and put in operation by the Chevrolet Motor Company several months ago.

The Board of Water Commissioners, Gates, N. Y., will take bids this month for a waterworks, estimated to cost $30,000.

The Elba Foods Products Company, Elba, N. Y., has let the general contract for the erection of a machine shop 112 x 260 ft., a warehouse 75 x 112 ft., and a power house 53 x 97 ft., to cost $40,000.

The Schoelkopf-Hartford-Hanna Company, Buffalo, has let contract for an extension to the engine room, 45 x 57 ft., at its plant, Abbott road and the Buffalo Creek Terminal Railroad.

The Remington Arms Company, Ilion, N. Y., has let contract to James Stewart & Co., 30 Church street, New York City, for the erection of four factory buildings, four stories and basement each, to be added to its plant, at a cost of $600,000.

The Buffalo Copper & Brass Rolling Mill, Buffalo, is building a further addition to its plant at Military road and the New York Central Railroad to operate for the filling of large contracts recently received.

The Savage Arms Company, Utica, N. Y., has let contract to Griffith & Pierce for erection of a three-story and basement addition to its plant, 54 x 400 ft.

St. Luke's Hospital, Utica, N. Y., is taking bids for a boiler house, 31 x 70 ft.

The foundry of the Smith & Gaffeny Company, Phoenix, was slightly damaged by fire last week.

W. H. Locke, 110 West Kennedy street, Syracuse, has commenced the construction of a machine shop 55 x 80 ft.

New England

BOSTON, MASS., April 6, 1915.

War business maintains its prominence in the machine-tool trade and in most other lines of metal industry. Foreign customers are more conspicuous than ever. They are placing large orders for all sorts of munitions of war and equipment for their armies. The list of requirements is a long one. The pressed metal people are making great quantities of brass powder cases for shrapnel and the larger sizes of projectiles—the totals run into very large amounts of money. The demand for steel projectiles increases rather than decreases.

However, some of the New England manufacturers are looking into the future and are safeguarding the interests of local customers. For example, one large manufacturer of screw machine products is avoiding all foreign orders, and is filled up with American business. Their customers include manufacturers of chucks, automobiles and their various accessories, motorcycles, and such products as toys, vacuum cleaners, baby carriages, electric lighting fixtures and other goods that cannot be connected with war. This company, in following out its policy, has just refused a foreign order for $75,000 worth of screw machine products.

The Seth Thomas Clock Company, Thomaston, Conn., has broken ground for what eventually will be an entire new plant. A head building will be 60 x 340 ft., and from it at either end will extend a wing 60 x 200 ft. All of this construction will be four stories. Between the wings will be a one-story building 120 x 220 ft., and in the rear of one wing will be a power plant. In front of the head building will be an office building 50 x 50 ft., four stories.

The P. J. Flannery Company, New Britain, Conn., will erect a one-story factory 80 x 128 x 135 ft.

The Winchester Repeating Arms Company, New Haven, Conn., has awarded the contract for a factory, 54 x 291 ft., five stories, of concrete and steel, fireproof construction, the given cost $175,000.

The Cooper Aircraft Company, Bridgeport, Conn., has been incorporated with a Connecticut charter and $50,000 paid in capital. The incorporators are John D. Cooper, James H. Crossley and E. K. Nicholson, all of Bridgeport.

Manufacturing industries in Norwich, Conn., and neighboring towns are deeply interested in the sale of the plant of the Norwich Compressed Air Power Company, on the Quinebaug River, at its junction with the Shetucket River, a power proposition that is well known among engineers because of its unusual features. The hydraulic power has been converted into compressed air, which has been transmitted by a pipe line to Norwich, where it has operated steam engines and motors. Several interests are seeking to purchase this water power for development as an electro-hydraulic unit.

The Mills Woven Cartridge Belt Company, Worcester, will erect an addition to its factory, 50 x 120 ft., one and three stories and basement.

Alva C. Rice, 5 Oberlin street, Worcester, Mass., has organized the Auxiliary Spring Company, which will manufacture an auxiliary spring for automobiles and a safety steering device. The details of the corporation organization have not been completed.

Worcester is to have a branch of the American Society of Mechanical Engineers, which will be organized at a meeting to be held at the Hotel Bancroft, April 8. The promoters of the branch are W. W. Bird, professor of mechanical engineering and director of the Washburn shops of the Worcester Polytechnic Institute; Dr. Ira N. Hollis, president of the Worcester Polytechnic Institute; Carl N. Dietz and Richard G. Williams, mechanical engineers of the Norton Company, Worcester, Mr. Dietz being the sales manager; George I. Rockwood, head of the Rockwood Sprinkler Company; R. Sanford Riley, of the Sanford Riley Stoker Company, and E. Howard Reed, secretary of the Reed & Prince Mfg. Company. Mr. Reed is secretary of the temporary organization.

The Neptune Hardware Company, Norwalk, Conn., has awarded the contract for its new factory. The building will be 60 x 200 ft., one story, with a two-story front.

The Kolynos Company, New Haven, Conn., recently reported as a manufacturer of toys, should have been designated as a manufacturer of dental cream, soap, etc.

Philadelphia

PHILADELPHIA, PA., April 5, 1915.

M. L. Shoemaker & Co., Delaware avenue and Venango street, Philadelphia, Pa., manufacturer of fertilizers, will erect a two-story brick factory addition, 27 x 39 ft., at a cost of about $1500.

The Belmont Iron Works, Twenty-second street and Washington avenue, Philadelphia, Pa., has been awarded the contract for the construction of a one-story steel foundry, 60 x 100 ft., for the General Smelting Company, Bullitt Building, Philadelphia, at a cost of about $1500.

Harrison Bros. & Co., Inc., Thirty-fifth street and Grays Ferry road, Philadelphia, manufacturer of lead, paint, etc., is building for itself a power house, 47 x 57 ft., one story.

The Fretz-Gross Company, Twenty-second street and Sedgley avenue, Philadelphia, manufacturer of umbrella hardware, has had plans drawn for a two-story brick factory, 75 x 121 ft. Peter Kuhn, 3058 North Eighth street, Philadelphia, is the architect.

Robert A. Feroe, Pottstown, Pa., has purchased a site 60 x 120 ft. and plans to erect a two-story brick factory for the manufacture of boxes.

Punxsutawney, Pa., will receive bids until 7 p.m., April 13, for erecting a pumping station, etc. S. B. Long is secretary of the Town Council.

East New Market, Md., will receive bids until April 15 for constructing a waterworks system. F. E. Loomis is secretary of the town commissioners.

The Newport News Furniture & Pattern Mfg. Company, Newport News, Va., will establish a factory. It was recently incorporated by Benjamin F. King and others, and desires prices on copper and nickel-plated moldings for show cases.

Indianapolis

INDIANAPOLIS, IND., April 5, 1915.

The American Potato Machinery Company, Hammond, Ind., has increased its capital stock from $50,000 to $125,000.

The Lafayette Engineering Company, Lafayette, Ind., has withdrawn from the field of structural steel construction work and will become a jobber of building material.

The International Steel & Iron Company, Evansville, Ind., has issued $25,000 of preferred stock.

The Metal Web & Spring Company, Indianapolis, has dissolved.

The East Gary Automobile Automatic Desk Company, Gary, Ind., has been incorporated with $55,000 capital stock to manufacture metal and other furniture. The directors are J. Varge, D. J. Veresh and M. Garber.

The Showers Brothers Furniture Company, Shelbyville, Ind., will spend $50,000 for additional buildings, including five dry kilns.

The Kuhlman Electric Company, Elkhart, Ind., manufacturer of transformers and other electrical devices, will move to Bay City, Mich., following the making of a contract with the chamber of commerce of that city.

Ft. Wayne, Ind., will purchase a new 725-hp. boiler for the city lighting plant. Bids will be received by the board of works up to April 15.

The Foster Machine Company, Elkhart, Ind., will build additions to its plant at a cost of $3000. W. H. Foster is manager.

The Royal Electric Light Company, Royal Center, Ind., has increased its capital stock $5000.

Chicago

CHICAGO, ILL., April 5, 1915.

Reports indicate that the Pullman industrial school project is to be pushed to completion, possibly for fall occupancy; but inquiry for the machine-tool equipment has not yet appeared. The preponderance of business continues to arise from export orders, directly or indirectly, and some of the local machinery interests have been concentrating their efforts in that direction. Domestic orders are scattering, although a few sales of importance have been consummated, including equipment to the amount of nearly $40,000 for an Indiana maker of gears. Concerning the higher prices now in effect on machine tools, there is some criticism from local machinery dealers who are not altogether pleased that their domestic trade is thus compelled to compete with the abnormal foreign market. A few sales of a machine or two to the railroads are all that the week brought out in that direction.

The Rockford Lathe & Drill Company, Rockford, Ill., is building an addition to its factory which will nearly double its floor space.

The Fiedler Process Veneering Company, Chicago, has been organized with a capital of $2500 to manufacture veneer for iron, steel, copper and other metals. The incorporators are Clarence M. Beard, Ralph F. Stern, 155 North Clark street, and David Jotzinger.

The Anderson Ratchet Company, Chicago, has been formed to manufacture tools, wrenches, etc., by Anton T. Anderson, William Daniel, Calvin R. Ocker and Harvey H. Daniel, 830 West Fifty-fifth street. The company has an authorized capital of $5000.

The Chicago Auto Wheel Company, Chicago, has been incorporated with a capital stock of $10,000 by John E. Kelley, H. H. McCarthy and M. V. Walsh.

Mrs. H. Hecker, 3575 Archer avenue, Chicago, will erect a one-story garage, 50 x 150 ft., from plans prepared by Hall & Ostergren.

The Blakeslee Motor Company, Chicago, will build a one-story garage, 50 x 165 ft., at 4638 Washington boulevard, at an approximate cost of $20,000.

Elmhurst, Ill., has voted $35,000 for the installation of a municipal water plant.

The Potter Mfg. & Lumber Company, Downers Grove, Ill., has been incorporated with a capital stock of $50,000 by Rupert E. and Harry M. Bateman, and others, and will equip a mill and wood-working plant.

The Abingdon Clay Company, Abingdon, Ill., has been incorporated with a capital stock of $40,000 by George E. Diersson, Samuel S. Holmes, and others, and will equip a clay-working plant.

The Seymour & White Heat, Light & Power Company, Champaign, Ill., has been incorporated with a capital stock of $12,000 by William Murray, Orlando S. Murray, and others.

The Rockford Milling Machine Company, Rockford, Ill., has increased its capital stock from $125,000 to $150,000 and will increase its mechanical capacity.

The Luther Co-operative Elevator Company, Luther, Ill., has been incorporated with a capital stock of $18,000 by Luther W. and Roy W. Cross, W. G. Holland, and others, and will equip a grain elevator and mill.

The Allneeda Milling Company, East St. Louis, Ill., has been incorporated with a capital stock of $75,000 by F. J. Malone, J. C. Ferguson and Fred Roberts, and will engage in feed and milling business.

Marcus, Iowa, has ordered the issuance of $25,000 in bonds to provide a waterworks for the town.

The Perfection Tire & Rubber Company of Chicago will build a factory at Ft. Madison, Iowa. The buildings and equipment will represent an outlay of about $90,000. It is the intention to have the plant in operation by the last of July.

The Syracuse Pump & Mfg. Company, Syracuse, Kan., has been incorporaed with a capital stock of $30,000 by E. E. Helfrith, Samuel Yaggy, and H. Helfrich, to manufacture irrigation pumps. It has erected a demonstration plant and begun operations. Samuel Yaggy is in charge.

The Mayer Bros. Company, Mankato, Minn., is having plans drawn for a machine shop, 80 x 400 ft., to be equipped with an electric traveling crane, to double the present capacity of its plant. Louis L. Mayer is president and general manager.

The J. H. Gorman Implement Company, Fairmont, Minn., has been incorporated with a capital stock of $50,000 to continue the business of J. H. Gorman, deceased. The incorporators are Mary M., Theodore E., Leo. R., and Anna L. Gorman. Theodore E. Gorman is president.

The Winona Foundry Company, Winona, Minn., is to build a new foundry which will cost in the neighborhood of $5000, and modern mechanical appliances will be installed for molding and for handling materials.

The Brite-Lite Company, Albert Lea, Minn., will erect a factory.

The Mobridge Light & Power Company, Mobridge, S. D., is constructing an addition to its plant to enlarge its present capacity.

Detroit

DETROIT, MICH., April 5, 1915.

The machinery market continues to improve and conditions locally are such that a fair degree of activity is in prospect for some time to come. The automobile manufacturers are greatly pleased with the outlook and practically all plants are running full time. A great many other lines of manufacture in Detroit are influenced by the automobile industry and the trade stimulus is being broadly felt. Dealers report that all classes of machine tools are in better demand and inquiries are also encouraging. No large lists are before the trade. Second-hand tools are not in as good request as new equipment, but a certain amount of machinery of this class is moving. Building conditions are improving and some industrial constructions are reported, although no large factory projects have appeared lately.

The Edison Illuminating Company, Detroit, has begun the erection of an electric substation on Congress street near Wayne street, to cost $75,000. The new power plant will be 42 x 120 ft.

The Ford Motor Company, Detroit, has purchased a tract of 58 acres adjacent to its present plant. A number of rumors are current to the effect that a tire factory and electric car plant will be erected, but the rumors are denied by the company and no statement will be made at present as to what purpose the property will be devoted. It states in regard to rumors concerning a plant near New York that its present facilities in the East are quite sufficient to look after its business in that section, and that the report that it was planning to purchase sites in Sparkill, N. Y., and Newark, N. J., is untrue.

The recent damage to the plant of the Detroit Foundry Company, Detroit, Mich., will not require any immediate replacement of machinery.

The Michigan Steel Castings Company, Detroit, has increased its capital stock from $90,000 to $210,000.

The Bra-Bec Mfg. Company, Detroit, has been incorporated with $2000 capital stock to manufacture a line of supplies and specialties. H. A. Beck, C. L. Bessert and C. A. Brady are the incorporators.

The Remy Electric Company, Detroit, has broken ground for the construction of the first unit of its new plant.

The Studebaker Corporation, Detroit, has awarded contracts for the erection of a four-story brick addition to its Clark avenue plant.

The Detroit Steel Products Company, Detroit, has filed amended articles of incorporation increasing its capital stock from $500,000 to $1,250,000.

The Pontiac Chassis Company, Pontiac, Mich., has been incorporated with $100,000 capital stock to manufacture automobile chassis. The new company will operate plants in Pontiac and Detroit. R. A. Palmer is general manager.

The Owosso Produce & Storage Company, Owosso, Mich., will shortly begin the erection of an ice-making plant and will double the capacity of its cold-storage plant. John R. Tyler, Chicago, is president.

The Superior Refilled Broom Company, Allegan, Mich., has been organized by I. A. and V. E. Clark to manufacture brooms. It has acquired a factory and will install machinery at once.

The Twin City Boiler Works, St. Joseph, Mich., whose plant was recently destroyed by fire, has acquired a factory building at Benton Harbor and will remodel and equip it for the manufacture of boilers. James Isbell is the proprietor.

The Lenmar Mfg. Company, Saginaw, Mich., has been incorporated with $25,000 capital stock to manufacture paper-baling machines. O. L. Dittmar, F. E. Holden and J. A. Marx are the incorporators.

The Nelson Brothers Company, Saginaw, Mich., manufacturer of gas engines, etc., will double the capacity of its plant by the addition of two large wings to its present building.

The Metal Products Company, Detroit, manufacturer of automobile parts, has filed a petition for dissolution. The

company recently disposed of its assets to the Timken-Detroit Axle Company.

The National Brass Company, Grand Rapids, Mich., will increase its capital stock from $90,000 to $200,000, of which $50,000 will be a preferred issue. The expansion of the company provides for the absorption of the Hardware Supply Company and for the erection of an addition to the present plant, 65 x 150 ft. At a recent meeting of the stockholders W. W. Huelster was elected president, vice Otto G. Kutsche, resigned.

Milwaukee

MILWAUKEE, WIS., April 5, 1915.

For the first time in nearly a year monthly building figures are showing a gain. The March aggregate of approximately $1,000,000 is over one-third more than that for March, 1914. The number of permits issued shows an almost identical increase. The building inspector's forecast for the remainder of the year, based on advance notices given by prospective builders, will give 1915 a substantial increase over the previous year.

Foreign business in machine tools is still brisk, but domestic demand is dragging. The same may be said of miscellaneous metal trades lines. A Kenosha concern is filling an order amounting to five trainloads of cots for Great Britain, and motor-truck builders continue to receive repeat orders. The employment situation is reported improved so far as skilled craftsmen are concerned and some shops are obliged to resort to advertising to get sufficient help of certain trades.

The Phoenix Mfg. Company, Eau Claire, Wis., manufacturer of sawmill and lumbering equipment, locomotives, etc., has increased its capital stock from $200,000 to $250,000 to better accommodate the volume of its business.

The H. Kirk White Company, Oconomowoc, Wis., manufacturer of chemicals, is having plans made by A. C. Eschweiler, architect, Milwaukee, for a new laboratory. It will be of concrete and stucco, two stories and basement, 25 x 120 ft.

The Simmons Mfg. Company, Kenosha, Wis., manufacturer of brass and iron beds, springs, etc., has started production on a large order for army cots for Great Britain. It will require five full trains to transport the material to the seaboard.

The Straubel Machine Company, Green Bay, Wis., has booked an order for three large toilet-paper-making machines for the Northern Paper Mills, Green Bay, previously reported to be making a $30,000 addition. With the new machines the mills will have 16 Straubel-Fogarty toilet machines in use.

The B. J. Johnson Soap Company, Milwaukee, has awarded the general contract for the erection of a $125,000 factory addition to Walter W. Oeflein, erector and engineer, Milwaukee, without competition.

The Federal Pressed Steel Company, Keefe avenue and North Pierce street, Milwaukee, has been granted a permit to build a $10,000 factory addition.

The Four Wheel Drive Automobile Company, Clintonville, Wis., which recently booked a $600,000 order for motor trucks for the British Government, is reported to have been given additional orders by the same purchaser amounting to a similar figure. Considerable equipment has been purchased and all needs are not yet satisfied.

The M. E. Mfg. Company, Manitowoc, Wis., has been organized by J. P. Eastman, Karl Muehlberg, Henrietta Eastman and Lucy Muehlberg. It is capitalized at $15,000 and will manufacture a patented hose coupler and a line of small tools.

The Business Men's Association of Plymouth, Wis., is negotiating with the Steiner Mfg. Company, manufacturer of gasoline and oil engines, Chilton, Wis., to move its plant to Plymouth and proposes to use the former Maxwell Hearse Body Company's plant, now idle.

The Sectional Roll Company, Green Bay, Wis., manufacturer of wood-working machinery and equipment, has increased its capital stock from $25,000 to $50,000 and will use part of the issue for the purchase of additional factory equipment to fill urgent needs brought on by increased orders. Alex. Roberts is president and W. H. Cannard is secretary.

The Elkhart Lake Light & Power Company, Elkhart Lake, Wis., has been incorporated with $100,000 capital stock by George and Gustav Brickbauer and William H. Burke. The promoters are not ready to divulge their plans.

The Vilter Mfg. Company, Milwaukee, Wis., has taken orders for export, one for 35,000 ft. of 2-in. ammonia piping for the Frigonifico Montevideo Sociedad Ammonia, Montevideo, Uruguay, and another for a 26-ton water-cooling plant for the Cuban Telephone Company, Havana, Cuba.

Cincinnati

CINCINNATI, OHIO, April 5, 1915.

A local machine-tool builder was recently asked by a large railroad system to submit figures on the cost of rebuilding a number of machines that the railroad has had in use several years. Although these machines were of the company's own make, it declined to bid on the repair job. This instance indicates that railroad shop equipment is generally in bad shape; it also shows what strenuous efforts toward economy are considered necessary by the operating departments. The railroads nearly all have large lots of second-hand rolling stock for sale, but most of it is unsuitable for use by industrial lines in the South, which heretofore have taken a large percentage of used equipment discarded by the larger railroads. It is needless to add that not one of the railroads has any second-hand machine tools for sale.

Orders for lathes and certain types of milling machines continue to be received from abroad, but local firms are not now taking any chances and a number of them insist on part cash with the order. The domestic demand continues to improve, but most of the tools bought are for firms who have orders for war supplies from Europe. Quite a number of machine tools have lately been shipped to Canadian customers, the largest one being the Canadian Car & Foundry Company. An interesting report received from a manufacturer of shapers states that the inquiry is considerably improved, with several orders received from domestic firms.

The first three months of the year were very satisfactory ones for tool and forging steel salesmen, and the total amount of business booked is said to be considerably more than double the record for the corresponding period of last year.

The Chesapeake & Ohio Railroad Company has had plans prepared and will begin work in a few days on the construction of a new roundhouse, machine shop and paint shop at its Netherlands yard, near Lexington, Ky. W. R. Hudson, Covington, Ky., is general superintendent; but information as to the mechanical equipment required may be obtained from J. R. Gould, superintendent of motive power, Richmond, Va.

The R. K. LeBlond Machine Tool Company, Cincinnati, has had plans prepared for an addition to its power plant, 75 x 98 ft., one story, of brick and steel construction.

The Bader-Giebel Machine Company, 3089 Colerain avenue, Cincinnati, incorporated recently, has fitted up a shop for the manufacture of special machines for the Rapid Electrotype Company, Cincinnati. It will also operate a jobbing machine shop, handling both designing and repair work. All equipment has been purchased.

The George Wiedermann Brewing Company, Newport, Ky., has let contract for a refrigerating plant to be erected at Hamilton, Ohio.

The Stone & Webster Engineering Corporation, Boston, Mass., has been awarded contract for a large department store building to be erected in Cincinnati for the H. & S. Pogue Company. Heating and power plant equipment will be required later.

B. Millikin, receiver for the Hamilton Machine Tool Company, Hamilton, Ohio, has filed the appraisers' report, showing assets of $271,000, with liabilities of only $130,000. The company has recently received some large export orders and it is believed the receivership will be lifted at an early date.

It is reported that the Chicago Mill & Lumber Company, Chicago, Ill., has had plans prepared for erecting a large box factory on Carthage avenue, Cincinnati. Details are not yet available.

The Board of Public Affairs, Oxford, Ohio, will open bids April 19 for two 72-in. x 16-ft. horizontal tubular boilers, complete with all fittings.

Lancaster, Ohio, will soon open bids for a 150-hp. horizontal tubular boiler.

The Recording & Computing Machine Company, Dayton, Ohio, has leased the plant of the Speedwell Motor Car Company, in Edgemont suburb, and will fit it up for the manufacture of a detonating device for shrapnel shells.

The Davis Sewing Machine Company, Dayton, Ohio, reports the receipt of a number of large orders from Europe and is now operating its plant on full time. No additions are planned at the present time.

It is reported the Athens Stove Company, Athens, Ohio, is having plans prepared for an addition to its plant. Details are not yet available.

The Springfield Publishing Company, Springfield, Ohio, has had plans prepared for an addition to its plant that will be 40 x 90 ft., one story, and of brick construction.

Cleveland

CLEVELAND, OHIO, April 5, 1915.

Orders for war material are bringing out a large volume of machine-tool business. The Recording & Computing Machine Company, Dayton, Ohio, which is reported to have taken an order for time fuses, and possibly other war supplies, is buying a large quantity of machinery, and in the past few days it is understood to have placed orders with Cleveland dealers and machine-tool builders for about 200 machines. Its requirements are mostly turret and engine lathes and automatics. A great deal of war material is still being figured on in this city, and this has resulted in much inquiry for machinery, manufacturers being unable to enter into final negotiations until they can be assured of the desired deliveries on the machinery required. An Ohio automobile company is considering the purchase of a large amount of equipment and there is a fair volume of business being placed by the automobile trade. The foreign demand for turret lathes and automatic machines is holding up well. Inquiries for cranes have improved. The New York Central Railroad has placed orders for a 48-in. 400-ton, double-wheel hydraulic press and a 42-in. carwheel lathe. The Western Reserve Steel Company, Warren, Ohio, has placed an order for a 124-in. Niagara shear.

The city of Cleveland will receive bids April 15 for water tube boilers for the waterworks department.

The Park Drop Forge Company, Cleveland, is enlarging its plant by the erection of an 80-ft. addition. This is the third addition to be built in the last three years. When completed the company will have 55,000 sq. ft. of floor space, to be used in the manufacture of crank shaft forgings, its principal product. The company is at present operating 39 hammers and hydraulic presses and is installing two additional furnaces in its heat-treating department, making 18 large furnaces in all. The plant is now equipped with overhead traveling cranes in the steel yard.

The Warren City Tank & Boiler Company, Warren, Ohio, will shortly begin the erection of a new plant on its present site, and has placed a contract with the McClintic-Marshall Company, Pittsburgh, for buildings for a complete plant for the manufacture of steel tanks of all capacities. The plant will be of all steel and concrete construction. The main building will be approximately 180 x 850 ft. About 1500 tons of steel will be used in its construction. It is the intention to have it completed in about five months. The building of the new plant will not interfere with the operation of the old one, which is running at full capacity night and day. The company is now in the market for considerable new equipment, including cranes and other machinery.

The Gramm-Bernstein Motor Truck Company, Lima, Ohio, has taken an order for 240 3½-ton motor trucks for delivery during the next 12 months. The company now has on hand orders for 60 trucks per month, or the total capacity of the plant working night and day. It has two factory additions under way.

The Toledo Machine & Tool Company, Toledo, Ohio, has awarded a contract for an addition to its plant.

The Tiffin Art Metal Company, Tiffin, Ohio, has awarded a contract to The A. Bentley & Sons Company, Toledo, Ohio, for a one-story brick factory 40 x 220 ft., and an office building 30 x 40 ft.

The Western Automatic Machine Screw Company, Elyria, Ohio, is having plans prepared for an addition to its plant.

The Swinehart Tire & Rubber Company, Akron, Ohio, will shortly begin the erection of a three-story factory addition, 105 x 122 ft., of brick and steel construction.

The Delaware Foundry & Machine Company, Delaware, Ohio, has placed in operation its new foundry, which occupies a building 60 x 140 ft.

The Central South

LOUISVILLE, KY., April 5, 1915.

Numerous inquiries and a fair amount of business have helped to encourage machinery manufacturers and dealers. Building operations and public service plants are taking a good amount of equipment at present, and though new manufacturing enterprises are not as numerous as they have been, enough are being started to give business to those interested in special equipment. Further South, where cotton conditions have been unfavorable for many months, business is picking up, though no large sales can be looked for in that territory for some time.

The Hegan Company, Louisville, plans the manufacture of a composition flooring material.

The broom factory of Charles P. Williams, 142 North Third street, Louisville, was damaged by fire to the extent of $2500 last week.

The Robinson Mfg. Company, Louisville, has been incorporated with $10,000 capital stock to manufacture automobile accessories. John C. Robinson and Robert F. Vaughan are the incorporators.

The Eureka Sales Company, Hopkinsville, Ky., plans the establishment of a factory to manufacture a patented harrow. E. W. Pratt, Jr., is in charge.

The Sebree Mining Company, Sebree, Ky., is in the market for a boiler. Percy B. Smith is the secretary.

The fiscal court, Pineville, Ky., will purchase a traction steam shovel. County Judge Asher is in charge.

O. H. Parker and T. A. S. Semple, Sebree, Ky., are equipping a brick and tile manufacturing plant.

Thurman Jenkins, Bedford, Ky., has plans for the establishment of an ice factory. A building has already been purchased.

The establishment of a street railway in Danville, Ky., is contemplated. The mayor should be addressed.

Fred Starkey, Somerset, Ky., and N. Starkey, Pikeville, Ky., will establish an electric light plant at Whitesburg, Ky.

The Irvine Light & Ice Company, Irvine, Ky., has purchased a site for a plant and is now ready to purchase equipment.

A. P. White, Cadiz, Ky., who recently established an electric power plant, is planning the installation of a street lighting system and will require additional equipment and supplies.

The American Metallic Packing Company, Lexington, Ky., is asking for prices on a Sargent air rock-drill with tripod and weights. First-class used equipment will be considered. It is also in the market for a double-drum double-hoisting engine, 6½ x 8-in., with boiler.

Beecher Smith, Somerset, Ky., is purchasing power and special equipment for a steam laundry and dry-cleaning plant.

The Mt. Vernon Bridge Company, Mt. Vernon, Ky., has been awarded a contract for the erection of the five-story steel addition of the Norton Iron Works, Ashland, Ky., which will begin the manufacture of woven-wire fencing. Most of the special equipment has been contracted for.

W. J. Lane and W. L. Ferrill, Hodgenville, Ky., will establish a stone-crushing plant.

The Blount Plow Company, Evansville, Ind., will erect a factory building to cost with equipment $200,000.

The Thomas, Harmon & Hickey Construction Company, Memphis, Tenn., plans to manufacture a patented automatic boiler gauge. George Gorham is master mechanic.

The Abingdon Ice & Cold Storage Company, Abingdon, Ky., is being organized and a plant will be equipped. Machinery for ice-cream manufacturing will also be installed.

H. A. Woosley, R. A. Musgraves and W. A. Frost, Shelbyville, Tenn., are to erect and equip an automobile garage and repair shop.

Henry J. Tidwell and Robert Bruce, McEwen, Tenn., will establish a sawmill. The boiler will have a capacity of 60 hp.

The Holston Tile Company, McCloud, Tenn., is in the market for drying equipment, etc., for dry-kilns at its hollow tile plant.

The Shelby County Cotton Oil Mill, Memphis, Tenn., has let the building contract and is ready to place orders for special machinery, a hoisting crane, etc. Edward Tilden is proprietor.

H. H. Self, Dickson, Tenn., will establish a sawmill at McEwen, Tenn.

The East Tennessee Marble Company, Knoxville, Tenn., will develop 60 acres of marble land near Neubert Springs, Tenn. In addition to quarrying, a marble mill, gangsaws and other equipment will be installed. H. H. Thrasher is president.

Frank Phillips, Cleveland, Ohio, is reported to have leased the plant of the Chattanooga Box & Lumber Company, Chattanooga, Tenn., for the purpose of converting it into an excelsior factory.

John I. Burnett, Winesap, Tenn., will establish a stavemill at Crossville, Tenn.

Morristown, Tenn., will need equipment for a filter plant. About $3000 will be expended. The mayor should be addressed.

An item in *The Iron Age* of March 11 regarding the Hooper Limestone Company, Chattanooga, Tenn., was in error. The correct name of the company is the Hooker Limestone Company. J. C. Sproat is manager.

Birmingham

BIRMINGHAM, ALA., April 5, 1915.

Some slight further improvement in the demand for sawmill supplies is noted owing to renewal of interest in the building of new plants as well as the starting up of old ones. The demand is improving with gratifying steadiness. General conditions are growing better with the higher prices for cotton and the large sales that are being made of the accumulated staple. The normal, however, has not been yet attained. Agricultural machines and gasoline engines are in greater demand.

The Carbon Limestone Company, Birmingham, Ala., will erect dry kilns and install grinding machines for the manufacture of pulverized limestone for agricultural purposes at a cost of $40,000.

E. G. Dougherty, Fairhope, Ala.; G. S. Streeter, New York, and others are planning the development of crucible and tile clay deposits. The proposed plant is to be driven hydroelectrically.

The Monte Sano Lime Works, Huntsville, Ala., will double its capacity.

A. R. Hardin, Halsell, Ala., will rebuild his planing mill and dry kilns recently burned with a loss of $35,000.

The Georgia-Carolina Lumber Company, Savannah, Ga., will rebuild its dry kilns recently burned at a cost of $20,000.

The Vitreous Clay Company, Atlanta, Ga., has been incorporated by G. H. Pittman, A. R. Colcord and others with a capital stock of $67,500 to manufacture brick, sewer pipe and tile.

The Southern Sewer Pipe Company, Birmingham, announces that its plant will be rebuilt in the near future. W. S. Dickey is president.

The city of Apopka, Fla., will establish an electric lighting plant at a cost of $10,000. F. H. Davis is mayor.

It is reported that Armor & Co., Chicago, Ill., intend to establish a meat-packing plant in Jacksonville, Fla., to cost $500,000.

The Thomas N. Baker Company, Macon, Ga., incorporated with a capital stock of $10,000, will establish a lumber plant.

The Elberta Crate Works, Marshallville, Ga., will establish a plant at Bainbridge, Ga., for the manufacture of crates, boxes and baskets at a cost of $100,000.

The Crescent Fire Alarm Company, Rome, Ga., does not expect to build a plant for the present, but is having its device manufactured by contract. A. F. Selman is manager.

C. J. Raby, Ft. Myers, Fla., and R. W. Main, have acquired property on which they will build a storage house and an electrical repair shop, installing electrical and machine shop equipment for repairing boats and engines.

Texas

AUSTIN, TEXAS, April 3, 1915.

Disagreeable and unseasonable weather has interfered somewhat with the machinery and tool trade the past week. The opening of a new oil field near Thrall, 35 miles north of Austin, has caused an increase in the demand for well-drilling machinery and other equipment.

The Star Bottling & Mfg. Company, Dallas, has been organized with a capital stock of $5500. Charles Bender is a stockholder.

The Artesian Ice & Cold Storage Company, Texas City, has increased its capital stock from $25,000 to $50,000. It will enlarge its plant.

Lester Freeman and Floyd Hollinger will build a cotton gin at Talpa.

The flour mill of the Plano Milling Company, Plano, which was recently destroyed by fire, entailing a loss of about $90,000, will be rebuilt.

The Consumers' Ice Company, Dallas, has been organized with a capital stock of $40,000 by M. L. Morris, J. O. Jones and H. M. Flanary.

The Republic Box Company, Houston, which has been organized with a capital stock of $10,000, will manufacture boxes, box shooks, shingles and other wood products. R. O. Harris is one of the organizers.

The Haskell Ice & Light Company, Haskell, will build an ice factory and electric light plant. It has a capital stock of $30,000. Morgan Jones is among the incorporators.

The Borderland Sugar Company, San Benito, which has a capital stock of $500,000, will take over and rehabilitate the local sugar mill.

The Las Cruces Electric Light & Ice Company, Las Cruces, N. M., plans to make improvements to its water and light plant, including the installation of additional machinery, etc.

The commissioners' court of Bexar County, San Antonio, will receive bids on April 15 for the construction of a water supply system, a power plant, etc., for the new county home for the aged.

George F. Lebus, Electra, Texas, will build a machine shop at Thrall. It will be equipped for repairing all kinds of oil-drilling and pumping machinery.

St. Louis

ST. LOUIS, MO., April 5, 1915.

Machine tool business continues at a low ebb, but dealers look for a steady improvement from now on. There were no new inquiries of moment in the market last week. Some few single tools are being sold, and some second-hand machinery, but the aggregate is still far below normal. Collections are fair, and money is reported easy, with increasing tendency toward its utilization in permanent investment.

The plant of the American Fixture & Show Case Works, St. Louis, recently burned, will be re-established at once, space for the plant having been leased at 1009 Lucas avenue. Wood-working machinery will be required. Milton D. Mendle is president.

The Electric Eraser Company, St. Louis, has been incorporated with a capital stock of $15,000 by James H. Hennessey, C. I. W. Emig and Albert L. Meyer, and will equip to manufacture electrically-driven erasers.

The Bee Tee Tire Company, St. Louis, has been incorporated with a capital stock of $12,000 by James D. Brennan, John P. Trader, and others, and will engage in the manufacture of tires, repair of automobiles, etc.

The National Pure Water Company, St. Louis, Mo., has been incorporated with a capital stock of $40,000 by Claude W. Montgomery, St. Louis; Edgar Smith, Webster Groves, Mo., and others, and will install water distillation equipment.

The pattern shop of the Alex Kilpatrick & Sons Foundry Company, St. Louis, has been burned, involving considerable loss. It will be replaced with its equipment.

The Caruthersville & Kennett Electric Light & Power Company, Caruthersville, Mo., has been incorporated with a capital stock of $200,000 by James S. Wahl, H. C. Schult and L. R. Jones.

The Farmers' Elevator Company, Silex, Mo., has been incorporated with a capital stock of $15,000 by C. B. Duncan, Benjamin Hudson and R. C. Chandler, and will equip a grain elevator.

The Lautz-McMurray Marble Company, Carthage, Mo., has been incorporated with a capital stock of $100,000 by K. C. Gill, John T. Gill and E. J. Lautz.

The Altenburg Lumber Company, Altenburg, Mo., has been incorporated with a capital stock of $10,000 by Ernst Poppit, G. Buck and Jacob Grebing.

A plant capable of the manufacture of 750,000 gal. of vinegar annually will be equipped at Springfield, Mo., by the Leo Cider & Vinegar Company, Falls City, Neb. A site has been bought.

The F. M. Wentzel Sheet Metal Company, Joplin, Mo., has been incorporated with a capital stock of $14,000 by L. H. Forn, F. M. Wentzel and W. C. Troutman, Jr., to manufacture sheet-metal products.

The Wittenberg Milling Company, Wittenberg, Mo., has been incorporated with a capital stock of $15,000 by W. F. and Joseph G. Weinhold and O. B. Lueders.

The Merkle-Hines Machinery Company, St. Joseph, Mo., has been incorporated with a capital stock of $25,000 by E. J. Merkle, G. E. Hines and A. Donovan, to manufacture and deal in machinery.

The Springfield Water Company, Springfield, Mo., will change the equipment of its plant, at present steam-driven, and will either install a generating plant or equipment for the transformation and use of hydroelectric current.

Plans are being prepared by the Fuller-Coult Company, Chemical Building, St. Louis, for an electric light plant for Poplar Bluff, Mo., to cost about $75,000.

The H. R. Banks Lumber Company, Kansas City, Mo., has been incorporated with a capital stock of $25,000 by H. R. Banks, S. C., and J. E. Turner.

The Four Wheel Drive Motor Company, Kansas City, Mo., has been incorporated with a capital stock of $500,000 by Theodore Ditmars, H. A. Dougherty and S. B. Gatewood, to manufacture motors, cars, etc.

Fulton, Mo., will install a pumping plant at its waterworks. W. J. McCarroll is superintendent.

Catchings & Co., Roseland, Ark., has obtained the contract for the drainage work at Osceola, Ark., for district No. 9, Mississippi County.

Joseph DeMarke, Arkansas City, Ark., will improve an electric light and waterworks system, which he has acquired.

The Cabot Light & Power Company, Cabot, Ark., has been incorporated with a capital stock of $10,000 by George P. Murrell, M. Young, J. D. Jenkins, and others.

Gurdon, Ark., will install an electric light plant. Albert C. Moore, Joplin, Mo., is consulting engineer.

A syndicate with plans for an investment at Hot Springs, Ark., of about $10,000,000 in an electric light plant and hotel, is represented by Henry I. Cobb, 901 Lexington avenue, New York. Detail plans are withheld.

J. C. Crotty and G. W. Kimball, Dallas, Tex., W. F. Corcoran, Pittsburgh, Pa., and others, will equip a plant at Camden, Ark., for the manufacture of lignite coal products, including creosote, paints, medicinal drugs, etc.

B. J. Chambers, Greenville, Mo., will equip a hickory handle plant at Imboden, Ark.

The State Agricultural School, Jonesboro, Ark., is in the market for one 50-kw. alternating current generator direct-connected to engine, two 150-hp. boilers, pumps, etc. V. C. Kays is in charge.

The Needmore Gin Company, Needmore, Okla., has been incorporated with a capital stock of $13,500 by Otto Woodring, David Henderson, R. B. Woodring and W. Warner, and will equip a cotton gin.

The Gate Electric Light & Power Company, Jennings, Okla., has been incorporated with a capital stock of $15,000 by W. E. May, Herbert Crowley and M. E. Michaelson.

The Rex Stove Works, Muskogee, Okla., has acquired a site, and will proceed to establish a plant.

Custer, Okla., will equip an ice plant with a daily capacity of about 10 tons, to cost about $10,000. H. H. Hatchet is superintendent.

The Economy Light & Mfg. Company, Oklahoma City, Okla., has been incorporated with a capital stock of $30,000 by B. L. Holk, A. Shank and others.

The Muskogee, Oklahoma & Gulf Railroad, of which H. C. Ferris, Muskogee, is receiver, will complete its shops, roundhouse and other improvements. The shops alone will cost, with machinery, about $300,000.

Water and electric light plants will be equipped by the Department of the Interior at the Choctaw Sanatorium, Choctaw, Okla. Cato Sells, commissioner, Washington, D. C., should be addressed.

The Oklahoma Rapid Transit Company, represented by S. A. Horton, Colcord Building, Oklahoma City, Okla., will build an electric traction line and power houses, etc., to operate between Oklahoma, Tulsa, Bartlesville, Muskogee and other cities.

Vicksburg, Miss., will purchase the local waterworks system for about $200,000 and will add equipment.

Seymour C. Jones, Okolona, Miss., is in the market for a cotton compress, preferring hydraulic presses operated by gas or gasoline power.

The Diversified Farmer Company, Shreveport, La., will equip about 12 canning plants in Louisiana, to cost about $10,000 each. C. W. Kelly, Crowley, La., is construction engineer.

The Gretna Power Company, Gretna, La., has been incorporated with a capital of $50,000 and will acquire and enlarge a local electric lighting plant. Charles F. Gelbke is among the stockholders.

S. M. Levy, chairman of an electric light, power and waterworks commission at Whitecastle, La., is reported in the market for equipment.

F. E. Martinez, 4832 Bank street, New Orleans, La., will rebuild and re-equip the sash and door factory recently burned with a loss of $50,000.

The Union Paris Canning Company, Farmersville, La., of which W. P. Chandler is manager, is in the market for power and special equipment. The capacity is to be 30,000 cans per day.

San Francisco

SAN FRANCISCO, CAL., March 30, 1915.

Metal-working machinery continues quiet, though a few single tools of fairly heavy types have been sold lately, and considerable business is coming from the smaller shops. Collections in all lines are still slow and some difficulty is found in getting financial support for many desired improvements in both large and small shops. The latter are disposed to look for bargains and second-hand equipment. One merchant reports a good-sized tool order from Mexico. In general, speculative activity is conspicuously absent, but business appears to be slowly reviving on the basis of actual requirements. From some accounts miscellaneous machinery is doing hardly as well as for the first half of the month, but business has resulted from a number of old inquiries and more projects are taking definite shape. The crop outlook is excellent, bringing a steadily increasing demand in agricultural lines; inquiry for mining machinery is becoming more widely distributed, and more demand is found for quarry and general construction machinery, including industrial railroad equipment.

The Commercial Machine Works & Supply Company, San Francisco, has been incorporated, with a capital of $100,000, by W. W. Price, D. O. Marks, and J. L. Sebastian.

The U. S. Lighthouse Service has placed an order with the local office of the Chicago Pneumatic Tool Company for two of the new type direct-connected compressors with oil engine drive for use in its exhibit at the exposition.

The Italian Vineyard Company, Los Angeles, has placed an order for two miles of Koppel steel-tie track.

The California Portland Cement Company, Los Angeles, is completing plans for a plant at Colton, Cal., for which it will require a 66 x 84-in. jaw crusher, a large gyratory crusher, 60-in. screens, and conveying machinery.

The town of Napa, Cal., is in the market for a small rock crusher.

E. C. Chalmers has taken over the interest of his partner, J. W. Geoghegan, in the Mayo Machine Works, Santa Ana, Cal.

C. J. Hedemann, manager of the Honolulu Iron Works, Honolulu, has gone to Japan to close contracts for a lot of sugar mill machinery.

The Engineering & Foundry Company, Stockton, Cal., has been incorporated with a capital stock of $100,000, by L. F. Grimsley, S. G. Mix, M. Davidson, L. L. Miller, and J. W. Hannah.

It is reported that Lewis Searing, of the Denver Engineering Works, Denver, Colo., manufacturer of mining machinery, has been looking for a manufacturing site in Los Angeles.

John Sindar, formerly of Salt Lake City, is preparing to build a broom factory at or near Sacramento, Cal.

The Pacific Northwest

SEATTLE, WASH., March 30, 1915.

The machine-tool trade in the Northwest is unchanged, with a few scattering orders on hand and a number of inquiries. The largest single item is the construction at the Seattle yards of the American Dredge Building & Construction Company of immense dredging machinery, costing about $100,000, to be used in garnering tin ores from Buck Creek, Alaska. This machinery will be put in operation this summer to increase the capacity of two similar plants placed on the Anacovik River last fall. With the three plants operating more than $500,000 worth of ore will be brought to Seattle next October for reduction in a smelting plant to be built by the Jamme Syndicate. The latter corporation has constructed a small plant here which has been successful in smelting tin concentrates shipped from Alaska, and new and modern machinery and equipment will be installed the coming summer.

The first shipment of Montana copper to New York via the Panama Canal has been made, going through Seattle. Shipping the copper westward through two states to send it East by the water route proves cheaper, even with the rail freight added.

Announcement has recently been made that 10 schooners have been chartered to carry lumber from Pacific coast ports to Australia and South America, the majority of this shipment to come from Puget Sound mills.

Announcement has been made that the Alaska-Gastineau Mining Company, Juneau, Alaska, will expend another $500,000 at once to increase the output of its plant and will install another power dam near Sheep Creek. B. L. Thane is manager.

The F. C. Crowe Irrigation Company, Spokane, has increased its capital stock from $250,000 to $1,000,000, the increase to be used in installing machinery for the manufacture of irrigation machinery. F. C. Crowe is president.

The Tacoma Wood Pipe Company, Tacoma, has been dissolved.

It is announced that the plant of the Eagle Macaroni Company, Tacoma, recently destroyed by fire, will be rebuilt immediately. Plans are now under way and it is stated the new factory will be reconstructed on a much larger scale.

Hunt Brothers, Salem, Ore., have announced their intention of installing new equipment in their fruit cannery, including two 100-hp. boilers.

Reuben Crimp, city clerk, Ellensburg, Wash., is receiving bids for the construction of a power plant, including a 1000-kw. steam turbine, condenser and feed water pump, one 325-hp. boiler, one 10,000 ft.-lb. oil-pressure water-wheel governor. The work will cost approximately $60,000.

A small electric lighting plant is to be built by Charles E. Wilkinson, Cottage Grove, Ore. The current will be generated by water power and the power station will be constructed this spring.

The Gibbons Lumber Company, Rochester, Wash., has been incorporated with a capital of $60,000 by C. W. Gibbons, E. A. Baker and J. G. Workman. It plans to construct a sawmill.

The Inland Empire Paper Company, Spokane, Wash., has increased its stock to $1,000,000. It is stated that the additional funds will be used in making improvements to the plant.

It is authentically reported that the Barnsley Brothers Cutlery Company, Monett, Mo., contemplates the removal of its manufacturing plant from Monett to Billings, Mont. The company manufactures razors, scissors, manicuring tools, etc., and the new plant will employ about 200 men. The first unit, a brick structure, 50 x 100 ft., will be erected this spring.

Libby, McNeil & Libby, Portland, announce that a packing plant to cost $50,000 will be erected at once in The Dalles, Ore., to handle both fruit and vegetables.

A sawmill is being built by Ernest Reinhard at Rathdrum, Idaho.

P. H. Walla and A. W. Robinson, Spokane, Wash., who recently purchased timber holdings near Spokane, have announced their intention of immediately installing equipment to cut logs at the rate of 40,000 ft. daily. The machinery is to be electrically operated.

Arrangements for the establishment of a box factory in Walla Walla have been completed by R. Beardsley and H. T. Valiquette, Spokane.

The Butler Contracting Company, Seattle, Wash., has received a contract from the Pacific Coast Steel Company, Seattle, for erecting concrete foundations and structural steel frame buildings in which the steel company will install its proposed new open-hearth furnaces and other improvements. A tin-plate plant is included in the improvement.

Work on the Duwamish waterway improvement, Seattle harbor, is going ahead rapidly and the propect will be completed by January 1, 1916. As soon as finished, a number of industrial plants will be located there, including a large coke plant to be built by the Seattle Lighting Company and a packing plant by the Carstens Packing Company.

Western Canada

WINNIPEG, MAN., April 2, 1915.

The general business situation here is slowly improving as the season advances, and the outlook is considered favorable on account of the extensive agricultural operations practically assured for this spring. For some time, however, industrial expansion will not amount to much and the demand for machinery for manufacturing plants will be limited. The financial situation is not favorable for much growth in manufacture.

Transcona, Manitoba, will soon call for tenders for two 6-in. centrifugal sewage pumps. The engineer is W. M. Scott, 204 Sterling Bank Building, Winnipeg.

The grain elevator of the Dominion Elevator Company, Ltd., Oak River, Man., which burned a few days ago, will be rebuilt.

The board of trade of Saskatoon, Sask., announces that a fiber company from the United States is about to build a flax mill there.

It is announced that the Cream of Wheat Company, Minneapolis, Minn., will build a large factory in Winnipeg this summer.

Government Purchases

WASHINGTON, D. C., April 5, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, April 27, schedule 8135, miscellaneous open type blowers for Brooklyn; schedule 8130, four generator sets for Philadelphia; schedule 8163, miscellaneous motor generator, etc., for Brooklyn; until May 4, schedule 8169, two induction motors and four pumping outfits for Washington, D. C.

Trade Publications

Pulley Covering.—Gripwell Pulley Covering Company, 601 Candler Building, New York City. Folder. Devoted to a covering for pulleys which is claimed to prevent slippage of the belts and increase the driving power 30 per cent. A brief discussion of what the covering, which is composed of a cement and a specially prepared canvas, will do, is presented, together with a short description of it. An illustration showing the difference in tightness between belts passing over pulleys covered with this material and those which are not, is presented.

Paint Mixing and Grinding Machinery.—Kent Machine Works, 37 Gold street, Brooklyn, N. Y. Catalogue. Refers to a line of paint mixing and grinding machinery which can be supplied for mixing lead, colors, heavy pastes, liquids, etc., and stone, iron and pulverizing mills. Illustrations and brief descriptions are presented of all the different machines, and there are a number of drawings showing the way in which they are installed in a plant.

Expansion Shield.—E. G. Long Company, 50 Church street, New York City. Folder. Gives brief description and specifications for a one-piece expansion shield for use in connection with standard machine bolts where it is desired to fasten iron work to a concrete wall. Views of the shield are shown partly expanded and also in use in connection with a bolt.

Copying Machine.—Cameragraph Company, Kansas City, Mo. Pamphlet. Relates to a photographic appliance designed for the production of facsimiles of any written or printed page, legal document, map, record, article of merchandise, etc. The prints are exposed, developed and fixed entirely within the machine without the use of a dark room, plate or film. The special features, such as mechanical focusing and developing, are briefly touched upon, and descriptions of the two types of machines, one of which photographs on both sides of the paper and one on but one, are presented. A number of reproductions of work done by the machine are included.

Steel Office Furniture and Filing Supplies.—Art Metal Construction Company, Inc., Jamestown, N. Y. Catalogue No. 757. Describes by numerous illustrations the construction and use of a line of metal office furniture, including roll and flat top desks, tables, safes, vault equipment, cupboards, shelving and filing cases of all kinds. Brief descriptions of the various units are given in connection with the engravings, and mention is also made of the supplies to be used with the furniture and the special equipment that can be built to order.

Boiler Chemicals.—Bird-Archer Company, 90 West street, New York City. Pamphlet. Presents information on the subject of locomotive boiler maintenance and care and contains an explanation of the workings of a line of polarized metallic chemicals for the softening of boiler feed water and the savings due to their use, as well as a treatise on the design, care and maintenance of boilers. General directions on the use of the chemicals and a few testimonials from users are included. The pamphlet is illustrated with a number of line drawings, showing the construction of the various types of boilers and the different tools used with them.

Couplers.—Monarch Steel Castings Company, Detroit, Mich. Folder. Concerned with a coupler for railroad cars, in which it is possible to operate the coupler either as a top or bottom lift without additional parts, and the operating parts are protected. Special emphasis is laid on the minimum number of parts entering into its construction, and the story is told almost entirely by the use of engravings.

Dipper Teeth.—Taylor-Wharton Iron & Steel Company, High Bridge, N. J. Bulletin No. 101-C. Describes a line of manganse steel dipper teeth, which are designed for use on steam shovels and dredges. Two types of teeth are shown, one of which can be reversed when the point becomes dull, thus sharpening itself. There are only two parts to either type of tooth, and a set of points can be changed easily and quickly. Illustrations of the two styles of tooth are included in the bulletin.

Bolt Pointing, Threading and Special Tapping Machines.—Webster & Perks Tool Company, Springfield, Ohio. Catalogue. Covers various types of single and multiple spindle bolt pointing and threading machines together with threading dies and stock holders. For the most part a pair of facing pages is given to each machine, an illustration being presented on one with a condensed list of capacity, equipment, etc., on the other.

Stencil Specialties.—New York Stencil Works, 100 Nassau street, New York City. Catalogue No. 37. Illustrates stencils of several types and their work, burning brands, steel stamps, stencil cutting outfits and raised figure plates for boilers.